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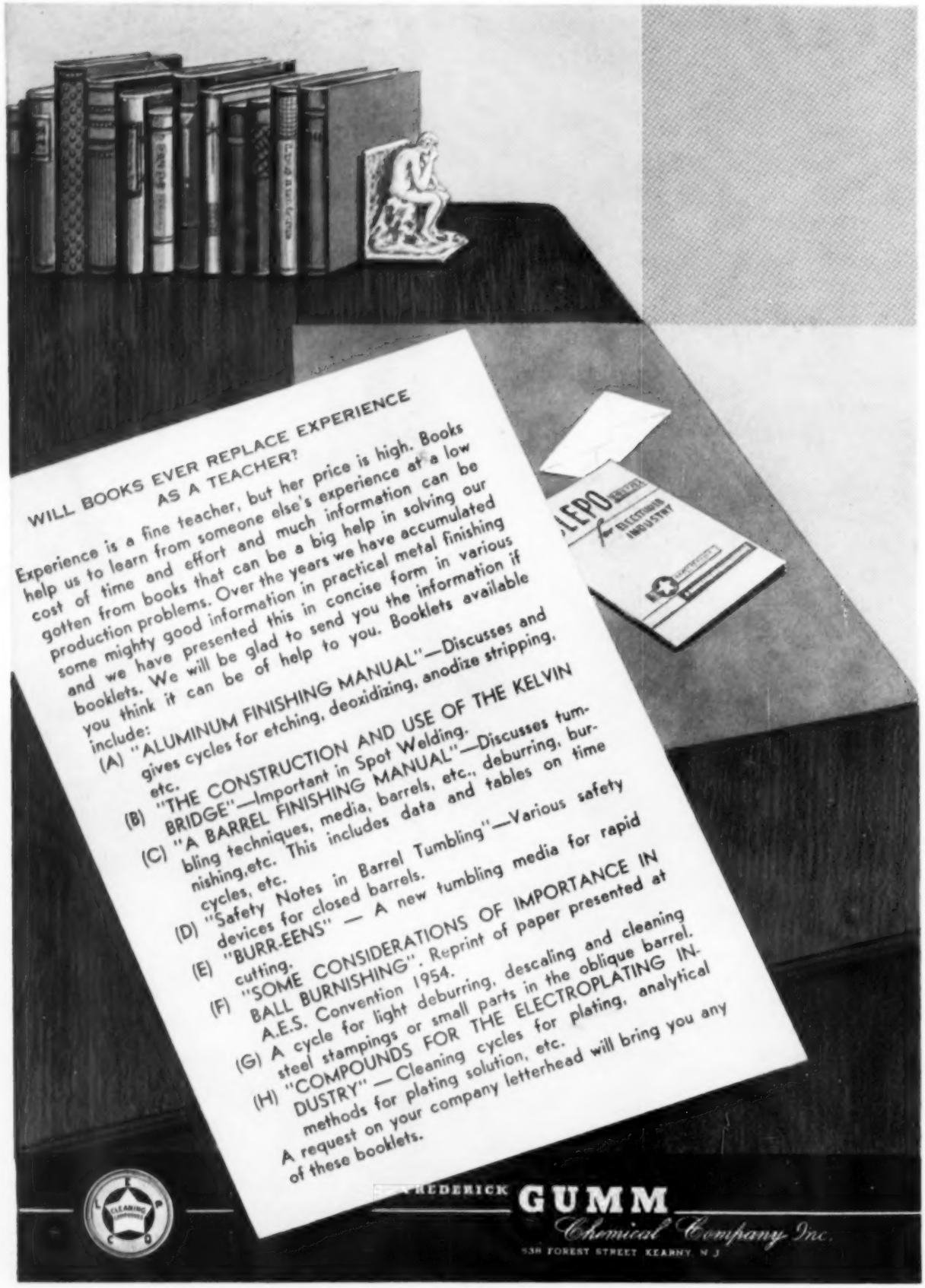
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Experience is a fine teacher, but her price is high. Books help us to learn from someone else's experience at a low cost of time and effort and much information can be gotten from books that can be a big help in solving our production problems. Over the years we have accumulated some mighty good information in practical metal finishing and we have presented this in concise form in various booklets. We will be glad to send you the information if you think it can be of help to you. Booklets available include:
(A) "ALUMINUM FINISHING MANUAL"—Discusses and gives cycles for etching, deoxidizing, anodize stripping, etc.
(B) "THE CONSTRUCTION AND USE OF THE KELVIN BRIDGE"—Important in Spot Welding.
(C) "A BARREL FINISHING MANUAL"—Discusses tumbling techniques, media, barrels, etc., deburring, burnishing,etc. This includes data and tables on time cycles, etc.
(D) "Safety Notes in Barrel Tumbling"—Various safety devices for closed barrels.
(E) "BURR-EENS" — A new tumbling media for rapid cutting.
(F) "SOME CONSIDERATIONS OF IMPORTANCE IN BALL BURNISHING". Reprint of paper presented at A.E.S. Convention 1954.
(G) A cycle for light deburring, descaling and cleaning steel stampings or small parts in the oblique barrel.
(H) "COMPOUNDS FOR THE ELECTROPLATING INDUSTRY" — Cleaning cycles for plating, analytical methods for plating solution, etc.
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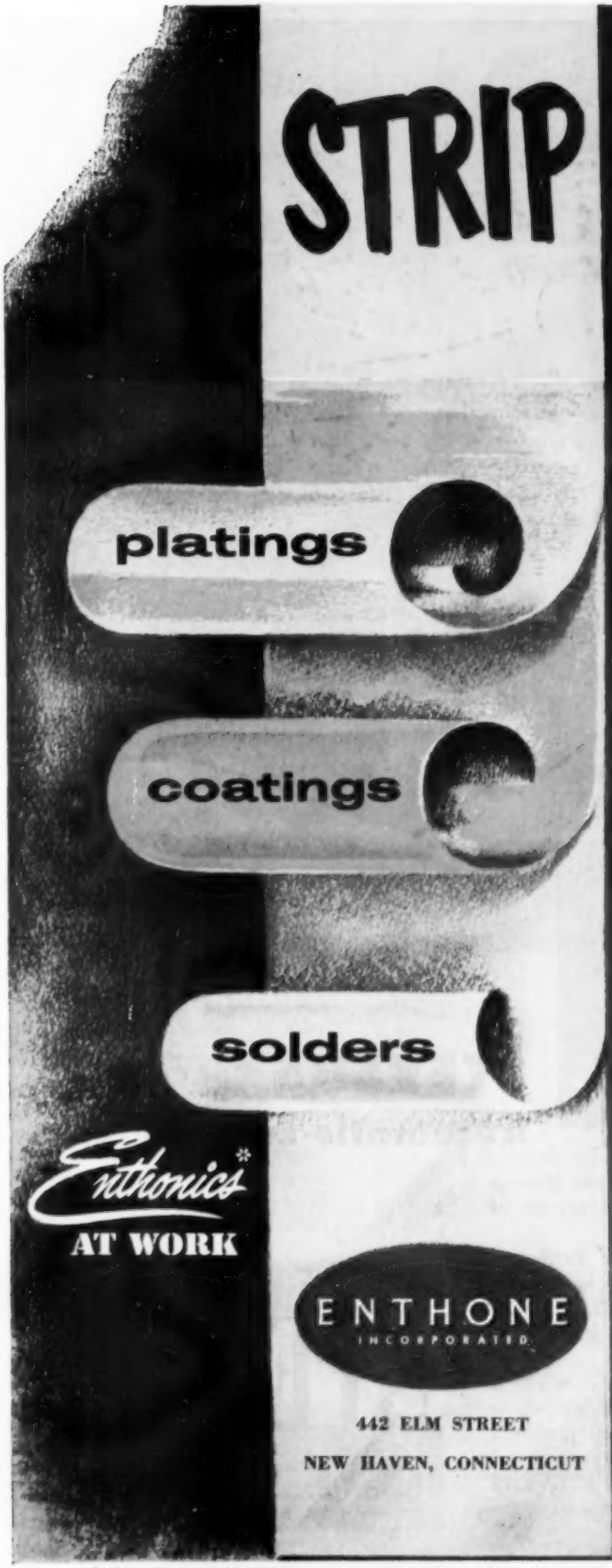

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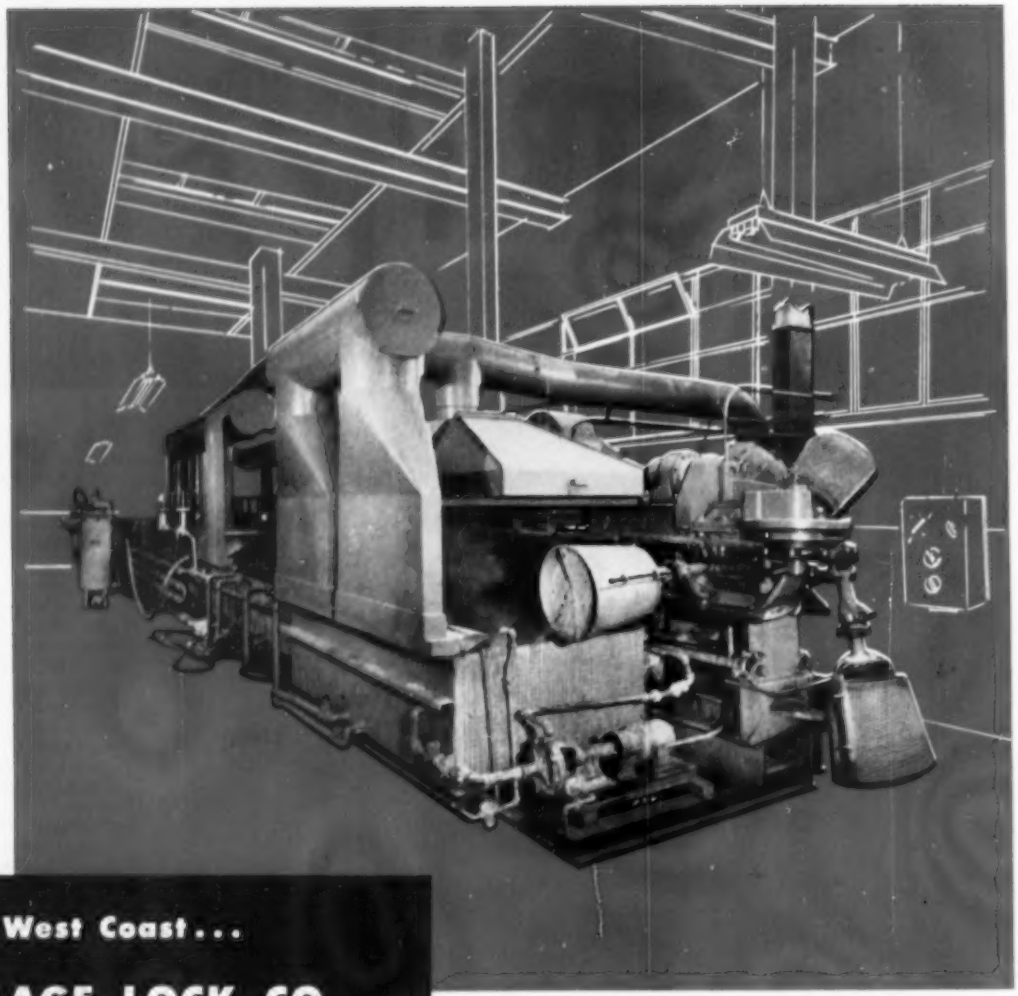

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plating

Journal of the American Electroplaters' Society

March 1955 **Vol. 42, No. 3**

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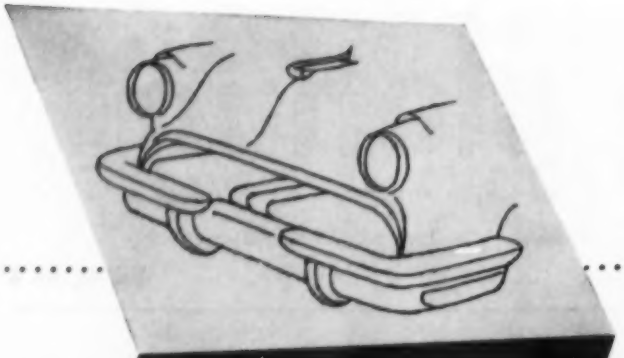

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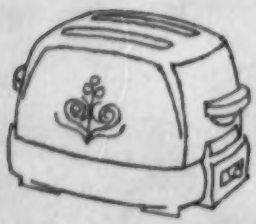

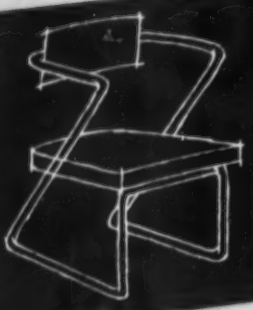

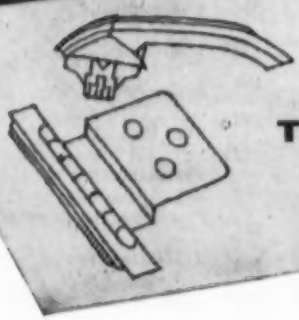

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zinc plating

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lead plating

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Editorial

Teamed for Progress — Research and Industry

THE broad primary aim of pure science is to push back the wall of ignorance and superstition which surrounds the human race. Many of our modern scientists, however, restrict their activities to the laying of foundations for future inventions or in developing new products and processes on established foundations. Scientific research, then, is a means by which new knowledge and new applications of knowledge are sought.

Few readers of PLATING will need to be convinced of the enormous importance of scientific research to our present day civilization and to our industrial progress. Since research by its very nature is an inefficient endeavor, some industrial leaders frequently consider the effort expended in applied research as a gamble of time and money against the possibility of a material return. As a bookmaker, the scientist has fortunately been able to offer excellent odds to the most skeptical industrialist that a better way of doing anything can be found.

To be sure, the trial and error method of making inventions, resorted to in our earlier technological development, involved considerable gamble; but scientific research today is no longer strictly a game of chance. Furthermore, applied science and technology must now advance by relying on the results of fundamental scientific research. We can no longer depend on practical experience alone in the development of new metal finishing or plating processes. Close co-operation between the highly trained research scientist and the practical operator or engineer is required for effective industrial progress.

Prior to 1920 most of the research carried out in this country was of the applied type, and although developmental research has continued to expand, more effort has been recently directed along fundamental lines. This is a healthy sign inasmuch as a storehouse of fundamental knowledge must be available for the use of the development engineer in his search for technological improvements. A recent report by the National Research Council indicated that three billion dollars was invested in 1953 in research and development. Approximately 150,000 scientists are employed by industry, government, universities, and associations like the AES in the fields of scientific research and development for industrial progress.

There is no necessity to review here the accomplishments which have resulted from research and its applications. We need simply to point out that most industrial concerns today report that new or improved products not in existence twenty or even ten years ago, now constitute almost all of their current production.

It is therefore essential that every organization, manufacturer or processor, which hopes to maintain a competitive position today, re-examine its technical features and particularly its research program. Industrial progress depends upon our discovering today what we shall do tomorrow when we shall be required to abandon what we did yesterday.

The members of the AES are able to point with pride to their contribution to industrial progress by way of their research program.

Carl J. Sepos

Cover Story

Tomorrow's Progress Through Today's Research

A similar slogan will be seen again and again in the coming months. In fact, it will blazon the Research booth at the IFE and be on the lips of everyone who attends the Convention in Cleveland in June.

The cover this month deals with symbols. There, gathered in somewhat special grouping, are the tools and the means of research. The abacus to denote mathematics and calculation, the scales to mean measurement, the beakers and titration units to carry the chemicals, the bottles and the flasks to hold the basic materials, the book to record accumulated knowledge, the graph to convey results, and the magazine to report it all.

Appreciative thanks to John Kosmos' "Electro-Finishing Research" labs, who loaned us the items pictured. We brought them into National Headquarters and there grouped, regrouped, argued over, photographed and finally printed. This is a PLATING Staff Photo.

We hope we have captured the essence of research with this cover; to convey the feeling of mystery and depth of thought; to train the sights of our readers on the far-away, theoretical goals which tomorrow will be the ordinary, everyday facts of the industry.

We join the Research Committee in saying loudly,

"TOMORROW'S PROGRESS THROUGH TODAY'S RESEARCH."

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AES SPONSORED RESEARCH

LEFT PANEL

Bottom half metal sheet shows how spreading rate is reduced for an oil which bonds tenaciously to metal surface—making removal difficult. Top half shows spreading rate with equal size drop different type oil

RIGHT PANEL

Top and bottom halves of metal sheet were covered with same oils as in left panel—given mild cleaning and then inspected by the atomizer test. The droplets of water show where any residual oil film remains

The spreading rate of an oil on metal can now be used to predict how difficult the oil will be to remove. The test is of particular value to metal fabricators, electroplaters and other metal finishers who usually use oils of unknown chemistry. These oils, while essential to metal working and corrosion prevention, must be removed before painting or electroplating. According to Professor Henry B. Linford of Columbia University, it is not necessary to know the composition of oils used for lubrication, cutting aid or rust protection in order to tell how hard it will be to clean a metal. The user will now be able to test an oil by watching how fast a drop spreads over a clean sample of the metal.

Laboratory work on metal cleaning, sponsored by the American Electroplater's Society, discovered evidence that such a relationship might exist. Further work by Columbia has very definitely developed the relationship between ease of oil removal and its spreading rate. The rate for any oil was found to depend on the roughness and the kind of metal being used.

Dr. Earl J. Serfass of Lehigh University, the AES Research Chairman, pointed out that the new test is of value beyond the metal cleaning field. Data obtained may help develop more tenacious rust preventatives, stronger filmed motor lubricants and more durable wax finishes. On the other hand, cutting tool coolants and lubricants that are more easy to remove may speed industrial production without loss of tool life.

This important study will be extended to cover greases and similar materials according to the society which supports and directs an extensive industry sponsored research program at a number of institutions.

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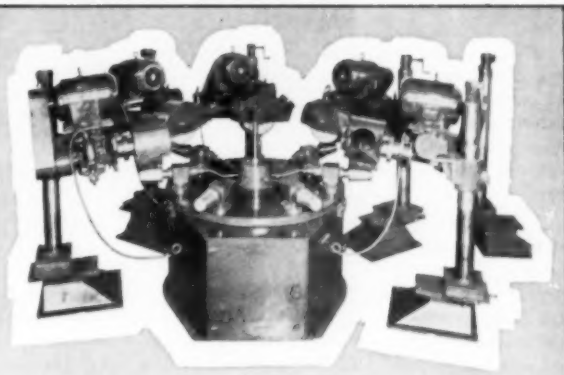

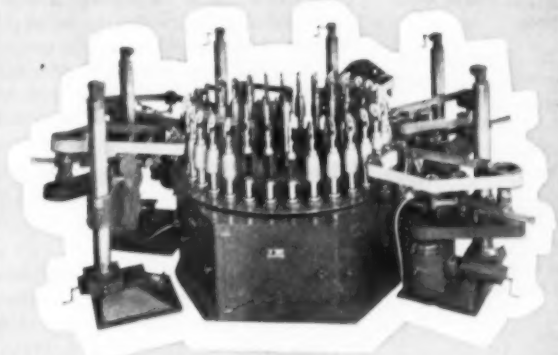

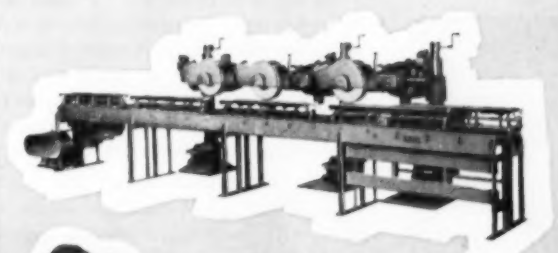

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CATALOGS ON REQUEST

Industry News

New Office and Laboratory Building. The R. O. Hull & Company, Inc., Rocky River, Ohio, recently completing its tenth anniversary in the field of developing and manufacturing addition agents for electroplating, anticipates to soon occupy its new main office and laboratories now nearing completion adjacent to the present plant site. The one-story brick building consisting of 4500 square feet of floor space was added to make room for increased facilities relative to new products and processes research and customers service administration.

The former office and laboratory space will be taken over by manufacturing activities which are currently being increased 50 per cent in line with business growth.

New Atomic Reactor to be Privately Owned. A contract for the design, engineering, and construction of a nuclear reactor has been awarded by Battelle Institute, Columbus, Ohio, to the American Machine and Foundry Company, New York.

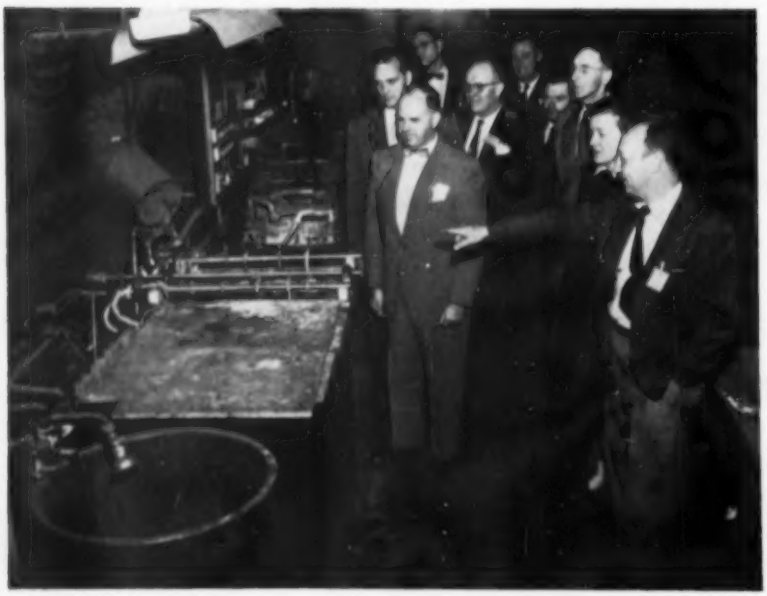
One of the first in the country to be owned and operated by a private organization, the reactor will be a key component in a $1,500,000 atomic research center Battelle is building fifteen miles west of downtown Columbus.

The reactor will be designed to be of broad use in the study of problems of industry. It will be of the so-called "swimming-pool" type and will be modeled somewhat after the Bulk Shielding Reactor at the Oak Ridge National Laboratory. Its primary function will be to provide an intense source of neutrons and atomic radiation for research uses. In this respect it will supplement a large cobalt-60 gamma radiation source now being installed by Battelle, and reactor development and hot-cell laboratories planned by the Institute, in providing private industry with complete facilities for studies in the field of atomic energy.

The reactor, together with auxiliary equipment and the building in which it is to be housed, will cost an estimated $500,000. Design work will start immediately. Construction will begin after review and licensing by the Atomic Energy Commission. The target date for "going critical" (starting the nuclear fission reaction) is February 1, 1956.

According to Dr. H. R. Nelson, manager of Battelle's department of physics and in charge of the new atomic research laboratories, the reactor will be designed to operate at 1000 kilowatts on uranium-235 fuel. Its core will be similar to that in the Materials Testing Reactor at the National Reactor Testing Station in Idaho. This type of reactor has proved versatile and capable of application to a wide variety of research and development problems.

Battelle Institute Tour



Giant Machine Installed at Budd Plant. A giant machine that washes steel chassis frames has been installed at the Red Lion Plant of the Budd Company, Philadelphia, manufacturers of railroad cars, automobile bodies, chassis and other metal products. Designed and constructed by the Industrial Washing Machine Corporation, Matawan, N. J., the new machine is one of the largest the company has ever made.

Big Bath

Because of the size of the material to be processed, the machine itself had to be of massive proportions. It is 60 feet long, 24 feet wide and 13 feet high. The conveyor width is 18 feet across with a working height of 18 inches, and the top of the machine is roof-shaped to provide greater strength in supporting the top baffles and top spray systems. The work to be processed is put on four strands of conveyor chain which returns inside the machine.

Heated by steam, the new machine washes, rinses and dries 800 channels per hour.

Fischer & Porter Forms German Affiliate. A German affiliate, Sartorius-Fischer, Göttingen, Germany, has been recently organized by Fischer & Porter Company of Hatboro, Pa., for manufacture and sales of industrial process control instrumentation and chlorinators. Formed with Sartorius-Werke, producers of world-famous analytical balances, the new affiliate will manufacture under Fischer & Porter patents and designs.

With plants already producing in England, France, and Holland, the new German facility will permit efficient service to the entire European industrial instrumentation market.

Duriron Buys Enzinger. The Duriron Company, Inc., Dayton, Ohio, has purchased the assets of the Enzinger Union Corporation, Angola, New York, effective January 1, 1955. The plant at Angola will operate as the Enzinger Division of the Duriron Company, and will continue the production of high quality stainless steel filters, multi-tube heat exchangers, and special equipment fabricated of stainless steel.

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IN RECOGNITION of its contribution to and membership on a production team responsible for an achievement unparalleled in industrial history—the building by General Motors in the United States of fifty million motor vehicles.

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brightens zinc die castings by chemical polishing, protects against corrosion

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CORROSION RESISTANCE, TOO! New Iridite (Cast-Zinc-Brite) provides exceptional corrosion resistance for bright-type chromate finishes . . . also guards against blueing or darkening by eliminating zinc plate formerly required in bright chromate finishing of zinc die castings.

AS A BASE FOR ELECTROPLATING—Lower mechanical finishing costs are possible where plated finishes are *required* since the brightness provided by this new Iridite may be sufficient.

LET US SHOW YOU what Iridite (Cast-Zinc-Brite) can do for you. Send us at least a half-dozen typical zinc die-cast parts for FREE PROCESSING for your own tests and evaluation. Or, for immediate information, call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified 'phone book. *IMPORTANT: when you give us samples for test processing, please be sure to identify the alloy used.*

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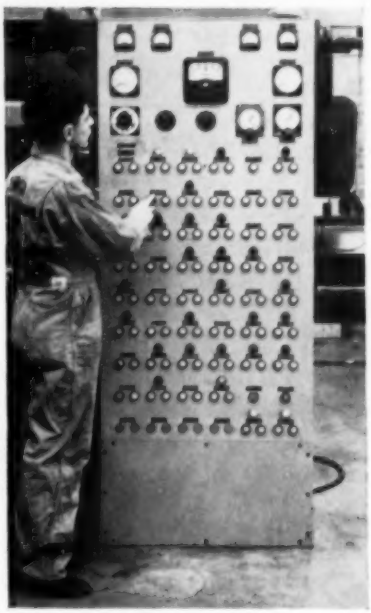
Industry News



"Tomorrow's" Controls

The World's Largest Sandpaper Maker. A machine as long as three city blocks was put into operation recently by Minnesota Mining and Manufacturing Co., St. Paul, Minn., makers of coated abrasives for industrial and home uses.

The huge 976-foot-long plant was built to apply advanced technology to the manufacture of coated abrasives, and represents the combined technical skills of 3M's engineering, research and production staffs.

The unique structure is actually a single manufacturing unit with a shell built around it. Specifications were precise, and exceeded those set down for processing today's coated abrasives. Research personnel and management determined that the plant have built into it the flexibility and controls necessary to make what the company calls "coated abrasives of tomorrow."

The firm's blueprint for "coated abrasives of tomorrow" is built around the continuous growth and development of coated abrasives throughout industry; and the increased need for new constructions in glue-bonded abrasives, and the ever-expanding field of resin-bonded abrasives.

The new maker will enable the 3M Company to take advanced pilot plant research and development and apply it to the actual manufacture of coated abrasives, according to the firm's management.

Electronic, neucleonic, mechanical and air equipment in the maker control machine speeds, curing temperatures, bond viscosities and other variable factors; and

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POTASSIUM CYANIDE

for copper and silver plating—

DEPEND ON DU PONT

...High-Purity KCN

IN CONVENIENT, DRY FORM

Du Pont's guaranteed high-purity potassium cyanide is ideal for *all* your copper and silver plating work.

Shipped in full open-head drums, Du Pont's crystalline potassium cyanide is easy to handle and convenient to store.

...A Reliable Supply

FROM DU PONT'S MODERN MEMPHIS PLANT

Du Pont has new production facilities at Memphis, Tenn., to assure you a dependable domestic source for potassium cyanide.

You can always count on fast, national delivery from Du Pont's conveniently located warehouses.

...Technical Service

FROM DU PONT FIELD MEN

Du Pont's potassium cyanide is backed by a practical technical service to help you maintain plating efficiency.

Just call any of the Du Pont district offices listed below for this prompt service.

E. I. du Pont de Nemours & Co. (Inc.) • Electrochemicals Department • Wilmington 98, Del.

DISTRICT OFFICES: Boston • Charlotte • Chicago • Cincinnati • Cleveland • Detroit
El Monte (Calif.) • Kansas City* • New York • Philadelphia • Export Division, Wilmington, Del.

*Barada & Page, Inc

CHEMICALS • PROCESSES • SERVICE

for **ELECTROPLATING**

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Industry News

penetrating radiation in the form of beta rays measures the uniformity of coating thickness and coating weights as the continuous web of coated abrasives passes through the maker to the drying tunnels.

These devices were developed to insure continued improvements in constructions and consistency in quality, which are major factors in forwarding the use of coated abrasives for grinding and finishing in industry.

A battery of recorders keeps a continuous check on each operation in the manufacturing process.

Acme's New Plant Addition

Acme Has Sixth Post-War Expansion. Acme Manufacturing Company of Detroit, Mich., announce an expansion of their plant facilities from 73,000 sq ft to 85,000 sq ft.

The expansion was made necessary because of new equipment recently developed and the demand of industry for automated metal finishing equipment.

Construction of the additional facilities is now under way with completion expected in February.

This is the sixth post-war expansion for this company.

Accompanying photo shows the additional plant area nearing completion at the right.

British Industries Fair. Industrial production in Britain is greater than it ever has been. There has been an all-round advance in output; and while many of the industries which have led this advance are working at or near the limits of their capacity, they are nonetheless planning for considerable increases in factories and equipment in the coming months.

It is against this background of increasing industrial vitality and output that preparations are now being made for the 1955 British Industries Fair to be held at Olympia Hall, London, and Castle Bromwich, Birmingham.

New Machines at British Fair. The heavy industries section of the annual British Industries Fair is held at Castle Bromwich, Birmingham. This year's exhibits will include many totally new designs of equipment, and many improved versions of former favorites.

A new hydraulic ram weighing only 20 pounds and standing a bare 5 inches high will be shown for the first time at the British Industries Fair (which runs from May 2 to 13). It is capable of raising water to a height of 200 feet.

A new fork-lift truck designed especially for use inside plants where heavy machinery must be transported along narrow passageways and around awkward corners, can be turned in a radius of less than ten feet, the British makers announce.

Mr. J. D. Udal, designer of a new inexpensive automatic unloader for power presses will be in the U. S. shortly to visit auto plants where he believes his machine will have the biggest scope.

The new "mechanical hands" are made in two types—one for removing components ejected from the upper tool of a power press; the other from the lower.

IN plastisol Unichrome Coating 218X you get genuine quality which quickly shows up on the job. It withstands all plating, anodizing and cleaning cycles—even those with *vapor degreasing cycles*. This keeps coating costs at bedrock, simplifies racking. Coating 218X won't contaminate even the "fussiest" of plating solutions—thereby avoiding future trouble and costly downtime.

This resilient coating doesn't chip, crack, blister. It rinses freely, cuts dragout, minimizes drag-in. Little wonder that Coating 218X is used so widely by cost-conscious platers.

Remember, Coating 218X is produced by United Chromium . . . the only company that has: (1) Developed plating processes; (2) Given service on plating problems; (3) Ten years experience in formulating highly corrosion-resistant plastisols . . . and therefore knows what quality a rack coating needs for most economical plating service.

UNICHROME Trade Mark COATINGS for METALS

Products of UNITED CHROMIUM, INCORPORATED

100 East 42nd St., New York 17, N.Y. • Detroit 20, Mich. • Waterbury 20, Conn. • Chicago 4, Ill.
Los Angeles 13, Calif. • In Canada: United Chromium Limited, Toronto 1, Ont.

Establishing New Sales Records for Manufacturers of Highly Styled Products

Sel-Rex Bright Gold Process

Hard, mirror-bright and corrosion resistant surfaces at no greater cost

Automotive

Pens and Pencils

Household Appliances

Leading manufacturers have proven that it costs no more to add an air of luxury . . . sales-making customer appeal to their products with the Sel-Rex BRIGHT GOLD PROCESS. Rich, mirror-bright surfaces that are hard and corrosion resistant are produced without scratch brushing or buffing—at costs that compare favorably with ordinary finishes. Sel-Rex BRIGHT GOLD PROCESS requires no special equipment and operates at room temperature.

Let us demonstrate how the Sel-Rex BRIGHT GOLD PROCESS can improve your product . . . create greater sales—at low cost. Get a trial order of the Sel-Rex BRIGHT GOLD PROCESS, or write for complete data to meet your particular specifications.

Accessories

Watches and Jewelry

Sel-Rex PRECIOUS METALS

Sel-Rex Precious Metals, Inc.

229 MAIN STREET BELLEVILLE 9, NEW JERSEY

Manufacturers of Sel-Rex Silver Sol-U-Salt and Bright Rhodium

Industry News

H-VW-M Vice-President Honored on 25th Anniversary. John A. Bauer, vice-president and member of the board of directors of Hanson-Van Winkle-Munning Co., Matawan, N. J., was honored on the occasion of his 25th anniversary with the company.

At a dinner on November 30 at the Princeton Club in New York, he was presented with a silver cigarette box inscribed with the signatures of the members of the board of directors. The presentation was made by Louis M. Hague, president of H-VW-M, and the dinner was attended by members of the board.

Bauer, a resident of Matawan, came to H-VW-M as advertising manager and has since held various executive sales positions. He was appointed vice-president in 1948.

H-VW-M's Dr. R. E. Zimmerman, John Bauer, L. M. Hague, Van Winkle Todd

Hanson-Van Winkle-Munning Co., one of the nation's leading manufacturers of electroplating and polishing equipment and supplies, was founded in 1820. Its main offices and plant are in Matawan. Other offices are located in leading cities across the country. The company also has a plant in Grand Rapids, Mich.

Udylite Secures Judgment on Bright Nickel Patent. On January 17, 1955, judgment was entered in the District Court of the United States for the Eastern District of Michigan, Southern Division, decreeing that U. S. Patent No. 2,191,813 granted on February 27, 1940, and owned by the Udylite Research Corporation for Electrodeposition of Nickel from an Acid Bath is good and valid in law.

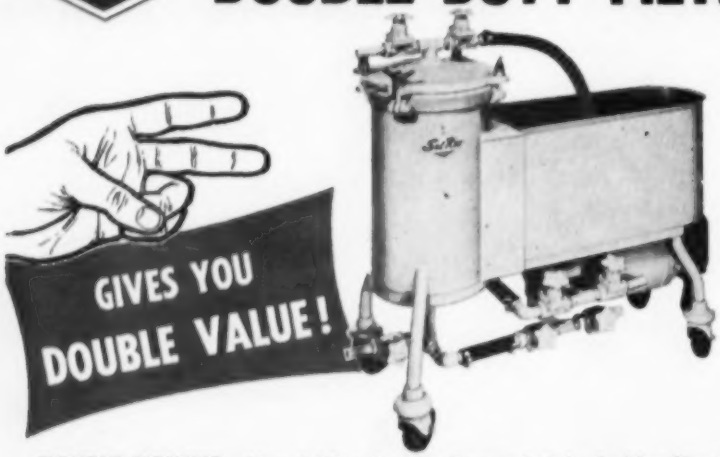
The defendant, Sandro A. Saporta, a former Udylite employee, was adjudged as having infringed the patent by using bright nickel plating solutions and practicing methods constituting the patented inventions by actively inducing others to infringe the patent and by manufacturing and selling brightening agents for use in the patented solutions.

It was decreed that a perpetual injunction be issued restraining the defendant from using the solutions and practicing methods constituting the patent, from inducing others to infringe the patent, and from making, using or selling the brightening agents covered by the patent.

A writ of Perpetual Injunction against the defendant Sandro A. Saporta in accordance with the decree was issued under the seal of the District Court of the United States on January 17, 1955.

Entirely New Filter Design!

Sel-Rex DOUBLE DUTY FILTER



DOUBLE VOLUME New Sel-Rex Annular Type principle doubles filtration area and volume without increasing size of unit.

DUAL PURPOSE Efficient low-cost operation with either cloth bag or porous stone.

EASY OPERATION and MAINTENANCE

- Entire filter element secured to tank cover . . . simple inspection and cleaning.
- Extra capacity precoat tank.
- Colored operating valves located at front of unit permits operation by unskilled help.
- Horizontal hose connections eliminates danger of leaks and ruptures.
- T-valve permits clean changeover from precoat to filtering.

Sel-Rex Filters available in standard sizes (Portable or Stationary models) 175 sq. ft. area. Larger units designed to specifications.

BART-MESSING CORPORATION

Dept. PL-3, 229 Main Street Belleville 9, N. J.

ATTENTION PLANT ENGINEERS!

In considering rigid, unplasticized Polyvinyl Chloride pipe, valves, fittings or custom fabrications watch for these 4 important factors:

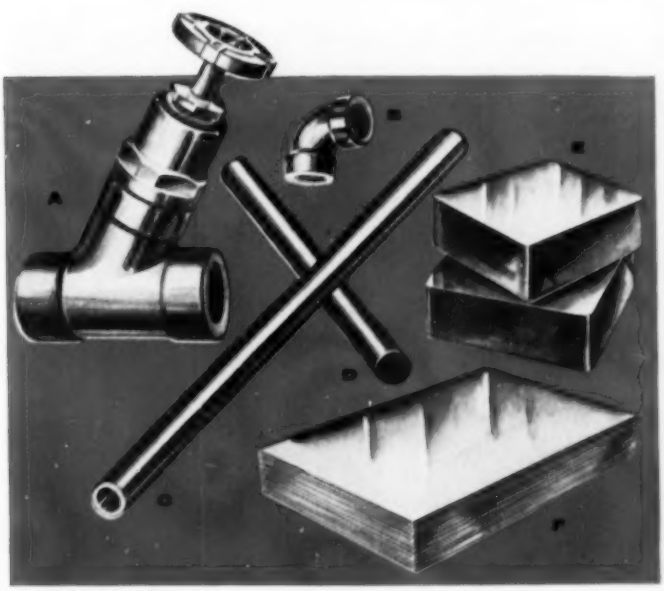
1 **Is the product properly manufactured?**
Boltaron 6200 is produced under rigid standards by the Bolta Division of The General Tire and Rubber Company.

2 **Is it properly fabricated and designed?**
Only well-trained, experienced engineers and fabricators are qualified to fill your individual needs. Every Boltaron fabricator in the United States and Canada is trained and licensed by Hartwell & Son.

3 **Is the application right?**
Unplasticized PVC is NOT a panacea for all industrial ills. It can and will perform with a high degree of satisfaction when properly applied to your specific problems.

4 **Are the company and the product proven in use?**
Hartwell & Son have been exclusive distributors of Boltaron for years. A list of their many successful installations in a wide range of industries can be supplied on request.

Boltaron 6200



With Boltaron 6200 you can obtain *from one source* a complete line of unplasticized PVC materials. Substantial inventories are kept at all times for prompt shipments. For further information write H. N. Hartwell & Son, Inc., Park Square Building, Boston, Mass., Box 114.

A All-Molded Valves
B Molded Fittings
C Seamless Pipe
D Rod Stock
E Block Stock
F Sheet Stock

Intersociety News

ASTM Committee Week Observed

Hundreds of committeemen of the American Society for Testing Materials converged on the Netherland-Plaza Hotel in Cincinnati the week of January 31 to take part in Committee Week. Meetings were held, progress reports were heard in the five-day session, and chairmen were elected for the coming year.

The following committees met: Advisory Committee on Corrosion, A-5 on Corrosion of Iron and Steel, A-10 on Iron-Chromium, Iron-Chromium Nickel and Related Alloys, B-3 on Corrosion of Non-Ferrous Metals and Alloys, and B-8 on Electrodeposited Metallic Coatings.

Of special interest to AES was the B-8 committee meetings on Electrodeposited Metallic Coatings. The main committee is headed by Clarence Sample of International Nickel while the subcommittees are under the leadership of the following: Fielding Ogburn, National Bureau of Standards, Sub I—Specifications, Papers and Definitions; Walter L. Pinner, Houdaille-Hershey, Sub II—Performance Tests; Ray F. Ledford, Industrial Pump and Filter, Sub III—Conformance Tests; Max Frager, Everite Machine Products, Sub IV—Electroplating Practice; and M. Darrin, Mutual Chemical Co., Sub V—Supplementary Treatments for Metallic Coatings.

The quality of and confidence in B-8 leadership was proven further with the unanimous reelection of all committee and subcommittee chairmen. PLATING salutes and congratulates these leaders for their contributions to this important ASTM-AES effort.

Among those representing the AES were Ken Huston, Past President; Ralph Schaefer, President, and P. Peter Kovatis, Executive Secretary.

Plating Staff Photo

Robert D. Miller (left) of Electric Autolite and member of PLATING Editorial Board, looks over B-8 agenda with B-8 Committee secretary, Dr. Richard Saltonstall of Udylite Corp.

MEPA 37th Annual Banquet and Entertainment of the Masters' Electro-Plating Association, Inc., 59 E. Fourth Street, New York 3, N. Y., will be held on May 7, 1955. The reception will be held at 6:30 P.M. in the Terrace Room and the Banquet at 8:30 P.M. in the Grand Ball Room of the Plaza Hotel, New York City.

The Masters' Electro-Plating Association, Inc., is the largest collective group of job finishing shop owners in the New York area. Officers of the group are: Al D'Agostino, Chairman of the Executive Committee; Sal Novelli, Vice-Chairman; Frank Kaiser, Treasurer; and Silvio C. Taormina, Executive Secretary. Mr. Novelli is also the Banquet Chairman.

NFMF AT THE JANUARY 29TH EDUCATION MEETING HELD IN CHICAGO

Plating Staff Photo

Left to right: Silvio Taormina, Executive Secretary, Masters Elec. Assn.; Lawrence Hay, Vice-President NFMF, (President, Plating Service Co.); Robert Greenwell, President, NFMF; Robert Giesel, (Adolph Plating, Chicago,) Chairman CEPI; Charles Jensen, (Jensen Plating,) Past Chairman, Chicago NFMF; Chuck Hanna, (Everingham Co.) Speaker

Electrochemical Society Plans Spring Meeting in Cleveland

The 1955 Spring Meeting of the Electrochemical Society will be held in Cincinnati, Ohio, May 1–5, at the Sheraton-Gibson Hotel. The 107th Meeting will feature sessions on Electric Insulation; Electronics, including Luminescence, Phosphor Applications, and Semiconductors; Electrothermics and Metallurgy, Industrial Electrolytics, and Theoretical Electrochemistry.

Roy O. McDuffie, Professor of Metallurgical Engineering, University of Cincinnati, General Chairman of the Convention, has appointed local committees to arrange for the meeting.

The United States Ranks 13th among the national standards organizations of 34 nations in degree of participation in international standards work.

Vice-Admiral George F. Hussey, Jr., USN (ret), managing director of the

Reelected to ASTM B-8 Leadership. (L. to r.): AES Past Pres. W. L. Pinner, F. Ogburn, R. F. Ledford, M. Frager, M. Darrin and C. Sample

Plating Staff Photo

Luxurious 1955 Packard 400 Hardtop — product of Studebaker-Packard Corporation, Detroit, Michigan.

Packard parts begin life with a Wyandotte bath

In the production of the great new Packards for 1955, Wyandotte products are used in vital cleaning processes: ALTREX* for aluminum soak cleaning; INDUSTRIAL D in spray washers, to remove fabricating compounds and other soils from steel parts; R-2 as an in-process rust inhibitor in spray rinses.

In fact, Packard has been using Wyandotte products for more than ten years — for more effective cleaning at lower use-cost. For in the manufacture of fine motorcars, quality is the foremost requirement — and cost is an important factor as well.

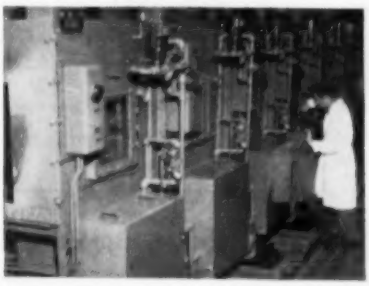
How about *your* business? Wyandotte offers the most complete line of metal cleaners in the industry: for burnishing and deburring; vat, steam-gun, washing-machine and emulsion cleaning; electrocleaning; rust removal; paint stripping; spray booths.

For technical assistance and data, call in your Wyandotte service representative, today. Or write us, c/o Dept. 2315, detailing your needs, along with specifications and requirements. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California. Offices in principal cities.*

*REG. U.S. PAT. OFF.

Call on Wyandotte to improve quality, cut costs

Packard uses Wyandotte cleaners in small soak tanks, to rid parts of cutting oil and soil; and in spray washes and spray rinses.



Wyandotte scientists can set up or duplicate any spray-washing cycle on this six-stage washer, to help solve your problems.

Wyandotte
CHEMICALS
J. B. FORD DIVISION

Research-developed products for metal cleaning

Can you afford to buy a low-priced plating filter?

In many instances the first cost of a Sparkler filter will exceed that of some other types of plating filters.

But the savings in operating cost soon will more than make up for the difference, and you will find your Sparkler a good investment both on the basis of cost and quality of performance.

For example:

Pre-coating Sparkler horizontal filter plates requires only about one-third the amount of filter aid used by some other filters.

Only a thin pre-coat is necessary, and you can get brilliant sharp clarity right from the start.

Intermittent operation of the filter will not break up the cake on horizontal plates. No renewal of pre-coating is necessary after a period of inactivity.

A wide range of fineness of filter media is possible with Sparkler filters.

Sparkler filters are ideal for alloy plating solutions. Non-metallic filter plates and rubber lined tanks are available when required.

These are a few of the many operating advantages that make Sparkler plating filters the most economical in labor and material cost and most satisfactory from a standpoint of filtering quality.

An extra set of plates that can be changed in a matter of minutes cuts "down-time" to a minimum.

Sparkler representatives in all principal cities are available for personal service on your filtering problems.

SPARKLER MANUFACTURING CO. MUNDELEIN, ILLINOIS

Sparkler International Ltd., *Canadian Plant*, Galt, Ontario • *European Plant*, Amsterdam, Holland

For over a quarter of a century, engineers and manufacturers of a complete line of industrial filtration equipment.

Intersociety News

American Standards Association, in a report compiled on international standards work for 1954, pointed out that the United States is still lagging far behind other countries.

The United States member of the International Organization for Standardization (ISO) is the American Standards Association. Through this association the United States holds secretariats of eight technical committees and participates in international standards work in such fields as mechanical, metallurgical, textile, rubber, and plastic industries; in the building trade; photography and motion pictures, and in many other important areas, including standards for hospital stretchers and transfusion equipment.

France leads the United States in international standards work by participating in 2½ times as many ISO committees as this country. The French Standards Association takes part in 79 of the 80 committees of the International Organization for Standardization.

The United Kingdom, which participates in the work of 72 committees, leads in the number for which it serves as the secretariat nation. It heads 18 committees.

Other countries with heavy participation in standards work are the Netherlands (75 committees), Germany (71), Italy (60) and Belgium (57). Russia's participation in the work is 15 per cent over that of the United States.

Third Basic Materials Exposition

The third Basic Materials Exposition will be held at Convention Hall, Philadelphia, May 31 to June 3, it is announced by Clapp & Poliak, Inc., the New York exposition management firm which produces the event. Simultaneously, it was disclosed that the scope of the exposition will be broadened and its name changed to include the subtitle, "The Design Engineering Show."

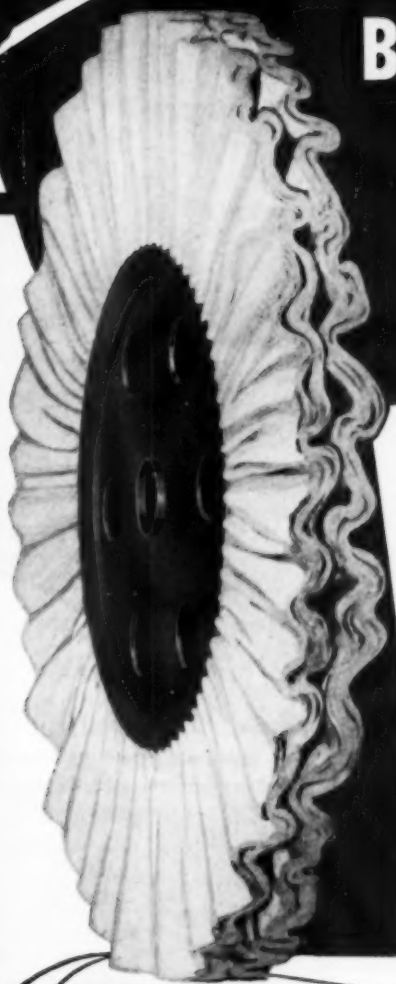
Western Plant Maintenance Show

Announcement is made of the West's Second Plant Maintenance and Engineering Show, scheduled for July 12, 13, 14, 1955 at the Pan Pacific Auditorium in Los Angeles.

The announcement, points out the importance of plant maintenance to the West's rapidly growing industry, as evidenced by the enthusiastic acceptance given the show in 1954.

New SCHAFFNER BIAS Buffs

give more mileage . . .



because

- . . . FULLY VENTILATED
- . . . COOLER RUNNING
- LOW COMPOUND CONSUMPTION
- . . . FEWER SECTIONS NEEDED
- . . . GIVES LONGER LIFE
- . . . LATHE FACED AND BALANCED

Manufactured and controlled in our own new modern up-to-date Buff plant. Can be tailor made for your toughest buffing problem

MADE BY THE MANUFACTURERS OF FAMOUS AND ACCEPTED SCHAFFNER NO NUBBIN BUFFING COMPOSITIONS.

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manufacturing company, inc.
SCHAFFNER CENTER • EMSWORTH, PITTSBURGH 2, PA.

CLIP TO YOUR LETTERHEAD

Phone ROsewood 1-9902

Please send me catalogue and complete information:

NOW PRESENTLY USING _____ Name, Manufacturer and Code No. of Buff _____
DIAMETER _____ CENTER SIZE _____
CENTER SIZE _____ ARBOR _____
PLY _____ COUNT _____
NORMALLY I USE _____ SECTIONS PER MONTH _____
NAME _____ TITLE _____
COMPANY _____ STREET _____
CITY _____ ZONE _____ STATE _____

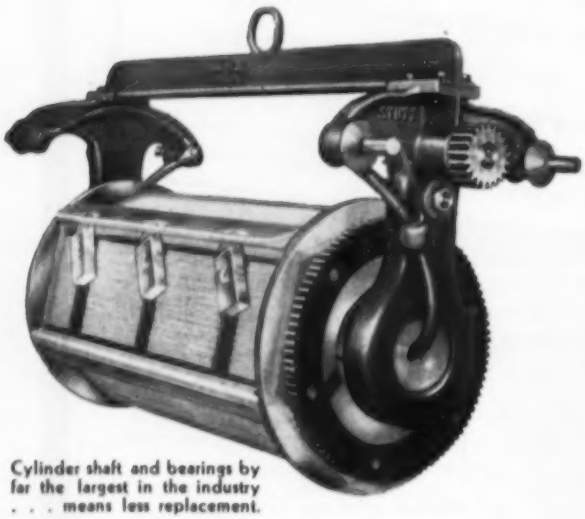
SCHAFFNER AIR-COOLED METAL-CENTER BUFFS ARE PRICED RIGHT • PRODUCED IN ALL DIAMETERS, CENTERS, PLYS AND COUNTS

STUTZ plating barrels of High Temperature LUCITE

HEAVY DUTY PRODUCTION
HIGHEST POSSIBLE CURRENT
COMPLETE CYCLE . . .

All solutions
(temperature to 185° F)

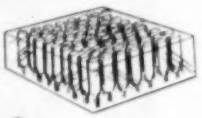
Stutz Plating Barrel Unit for continuous operation through Alkali Cleaning, Acid Pickling, Acid and Alkaline Plating solutions and rinsing. Largest number of cylinder perforations possible.



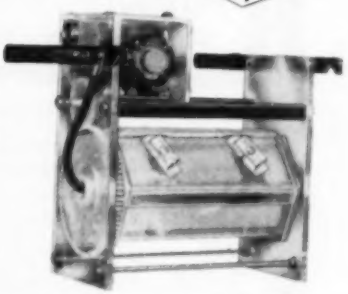
Cylinder shaft and bearings by far the largest in the industry . . . means less replacement.

Stutz Plating Barrel Unit, Motor Drive Mounted Overhead. Continuous rotation of cylinder from one operation to another and where a minimum of solution dragout is important. Roller bearing chain drive to absorb load shock. On a complete Barrel Plating installation, this type of equipment can be made at lower cost since motor drives are not required on each tank station.

Where extremely small openings are required, our patented Dual Hole is used. This design permits solution flow with a minimum of resistance.



Mention Production Barrel When Inquiring About Above



STUTZ DELUXE PORTABLE PLATING BARREL	
6" x 12"	$176.50
8" x 18"	$275.00
Stand	$37.50
Basket	$8.65

STUTZ *Deluxe Portable Plating Barrel*

The Stutz Portable Barrel is made in 2 standard sizes with cylinders having inside dimensions of 6" x 12" and 8" x 18". Standard openings are 3/32". Smaller or larger openings can be furnished as required.

GEO. A. STUTZ MANUFACTURING COMPANY

4420 Carroll Avenue • Chicago 12, Illinois

"Complete metal finishing equipment and supplies"

INDICATE A 315.

Finishing With The "Touch of Gold". In the finer grit sizes ALUNDUM B abrasive is unequalled for the polishing that means better looking products.

Across the range of polishing jobs . . .

Norton ALUNDUM* B Abrasive

adds the "TOUCH of GOLD" that steps up production and profits

Roughing With The "Touch of Gold" ALUNDUM B abrasive in the coarser grit sizes, removes stock faster, saves time and money.

In Norton ALUNDUM B abrasive you get a truly all-purpose polishing grain, expertly engineered to cut costs and improve product quality "across the board" in your polishing operations. Here are some typical advantages that mean top performance in every set-up:

- ***Uniform grain shape,*** the result of careful processing that eliminates flats and slivers, leaving only solid, blocky grains that stand up better and polish faster.
- ***Uniform grain sizings,*** with no oversize grains that mar the finish, no undersize grains that skip their share of work.
- ***High capillarity,*** assuring the easy absorption of adhesive that means longer lasting, better performing set-up wheels.
- ***Usable with cement or glue,*** it is equally firm-clinging and efficient with either.
- ***Made in all grit sizes*** from 20 through 240, to cover the widest range of polishing jobs, from roughing to fine finishing.

See your Norton Distributor for prompt deliveries of Norton ALUNDUM polishing abrasive. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

G 283

Making better products . . . to make your products better

NORTON

and its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

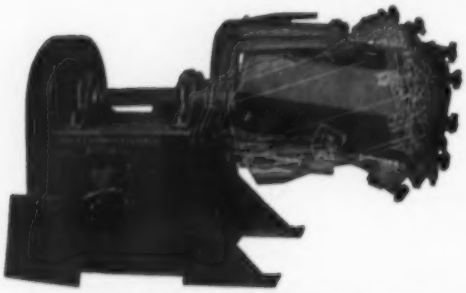
*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

USE "RELIANCE" PRODUCTS FOR

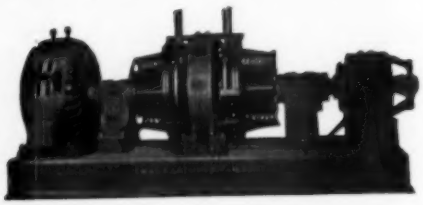
ECONOMY : EFFICIENCY : DEPENDABILITY

LET US SUPPLY YOUR NEEDS FOR YOUR PLATING OR POLISHING DEPARTMENT

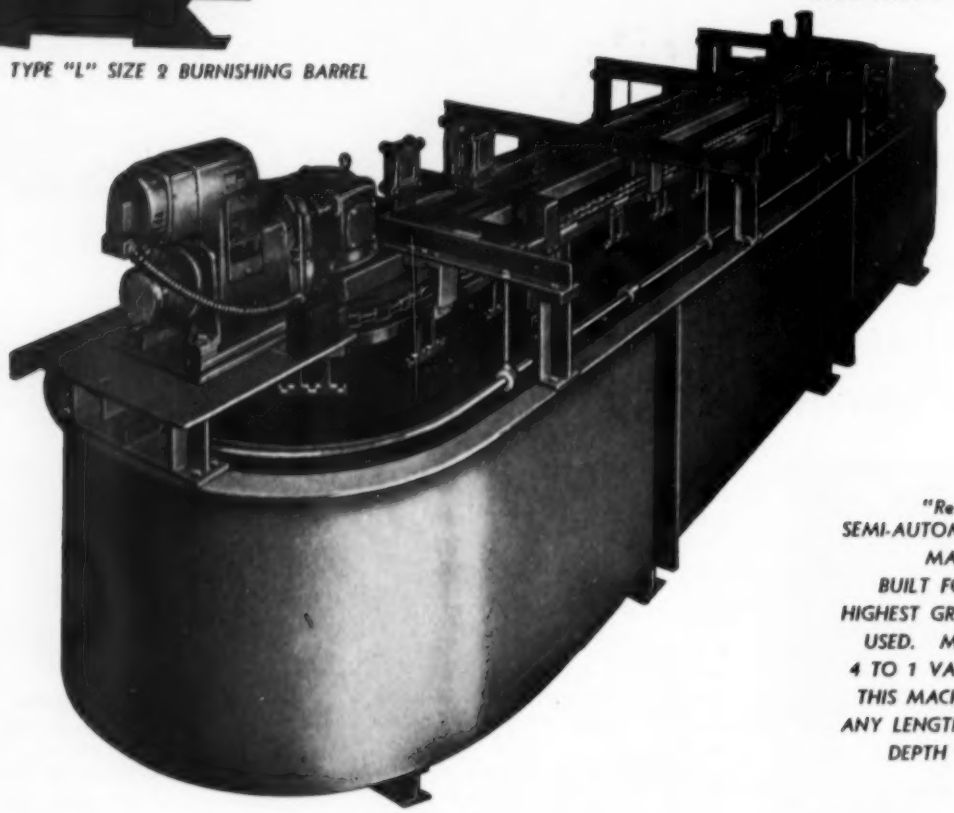
WRITE FOR FURTHER DETAILS



TYPE "L" SIZE 2 BURNISHING BARREL



3000 AMP. 6 VOLT GENERATOR SET



"Reliance" SEMI-AUTOMATIC PLATING MACHINE BUILT FOR SERVICE HIGHEST GRADE MATERIAL USED. MOTOR ½ HP 4 TO 1 VARIABLE SPEED. THIS MACHINE IS BUILT ANY LENGTH, WIDTH AND DEPTH OF TANK.

Chas. F. L'Hommedieu & Sons Co.

MANUFACTURERS of

Plating and Polishing Machinery

Complete Plating Plants Furnished

Chas. B. Little Co.
Newark, N. J.
W. R. Shields Co.
Detroit, Mich,
Powell Calvert
104 Second Street
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Gen. Office and Factory:
4521 Ogden Ave.

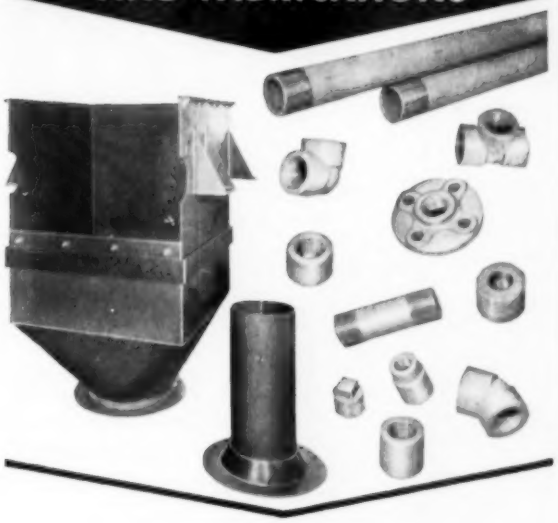
CHICAGO

Branches:
Cleveland
and
Los Angeles

STOP Corrosion with...

Van-Cor

PLASTIC PIPE, FITTINGS AND FABRICATIONS



★ *Both Chemically Resistant and Impact Resistant Types*

★ *Half the Weight of Aluminum, with High Tensile Strength*

★ *Readily Formed, Machined, Drawn, Molded or Welded*

AVAILABLE FORMS

SHEETS... 1/32" through 1". PIPE... ½" through 8" diameter (10 or 20 ft. lengths). ROUND BARS... ⅛" through 5" diameter (10 ft. lengths). WELDING ROD... ⅛" and 5/32" diameter.

TYPICAL APPLICATIONS

A rigid non-plasticized polyvinyl chloride, Van-Cor is fabricated into such products as: Ducts, Hoods, Chemical Tanks, Tank Liners, Plating Racks, Fume Stacks and Piping.

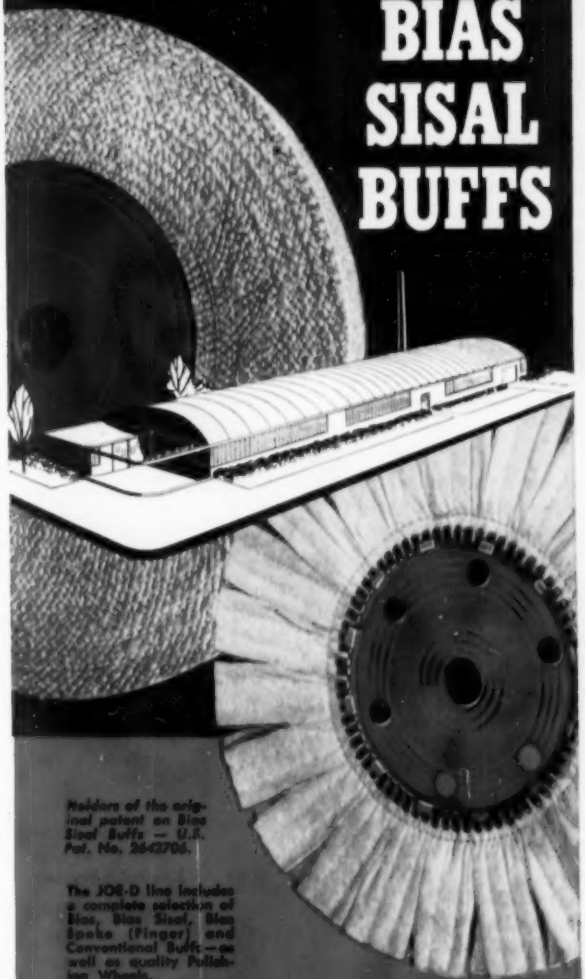
WRITE FOR ILLUSTRATED BULLETIN, SPECIFICATIONS, AND NAME OF NEAREST DISTRIBUTOR

INDUSTRIAL DIVISION OF
COLONIAL PLASTICS MFG. CO.
SUBSIDIARY OF THE VAN DORN IRON WORKS CO.
2685 EAST 79th STREET • CLEVELAND 4, OHIO

USE READER SERVICE CARD; INDICATE A 318.

The "House that Sisal Built"

JOE-D ... Originators of BIAS SISAL BUFFS



Holders of the original patent on Bias Sisal Buffs — U.S. Pat. No. 2642705.

The JOE-D line includes a complete selection of Bias, Bias Sisal, Bias Spoke (Finger) and Conventional Buffs—as well as quality Polishing Wheels.

Since its founding, the JOE-D Buff Company has specialized in Sisal — constantly experimenting and testing ways to give you faster-cutting, longer-lasting Sisal Buffs. Made of the finest quality imported sisal, specially woven and processed for guaranteed fray-proof performance . . . never a loose end to whip or scratch . . . always an even nap to hold compound and provide better color. For every Sisal Buff requirement, specify JOE-D, the original — and still America's finest — Bias Sisal Buffs!

ATTENTION JOBBERS: Some choice territories still available. WRITE TODAY!

the JOE-D Buff Company
SANDWICH, ILLINOIS • TELEPHONE 2171

USE READER SERVICE CARD; INDICATE A 319.

Personals

H. E. Martin, president of the Metal & Thermit Corporation, New York, has announced the appointment of **Richard O. Loengard** as vice-president.

Loengard joined the Metal & Thermit Corporation in 1919 and subsequent to 1926 was active in the management of affiliated and subsidiary companies of the Metal & Thermit Corporation in the chromium plating and metal coating fields. He has been president of United Chromium, Inc., since 1945 and will continue in this capacity as well as that of vice-president of Metal & Thermit Corporation.

In commenting on the appointment Martin said that he felt the move would result in closer coordination of the operations of the two companies.

American Machine and Metals, Inc. announces that **A. M. Harp** is returning to the company as general sales manager of the DeBothezat Fans Division, succeeding **C. J. Gaspar.** Harp, who has recently been vice-president and general manager of Connecticut Telephone and Electric Company, previously served for many years as DeBothezat Fans sales manager.

Announcement of the appointment of **William H. Ross** as vice-president of sales for Bart-Messing Corporation, Sel Rex Precious Metals, Inc., and Detroit Die Casting Corporation, associated companies in the Bart-Messing organization, has been made by President **Morris M. Messing.**

Ross

In his new position, Ross will be primarily concerned with the expansion of the national sales activities of the three companies. Widely known in the electroplating industry, he was formerly vice-president of sales with Wagner Brothers, of Detroit and has been associated with the Udylite Corporation as Michigan district sales manager and with United Chromium Corporation. He is an active member of the Detroit Branch of the American Electroplaters' Society and the Detroit Engineering Society.

Harry Lee Sennett has joined Allied Research Products, Inc., Baltimore manufacturer of the Iridite line of chromate conversion coatings, as Sales Engineer. He was formerly a sales engineer with the metal finishing division of Allied Research. Sennett will coordinate specification activities with various government agencies responsible for specification of chromate coatings. In addition, he will serve Iridite customers in the Delaware, Maryland, Virginia area. Sennett's headquarters will be at the company's home office at 4004 East Monument St., Baltimore 5, Md.

R. J. Studders, magnet development engineer, Carboloy department of General Electric Company, has been appointed manager of magnetic products engineering. He replaces **E. E. George,** recently appointed plant manager of Carboloy Department's Edmore, Mich., permanent magnet plant.

Studders

Studders joined Carboloy Department in 1950 when permanent magnet operations were centered in Schenectady, N. Y. His first association as a magnet engineer with the General Electric Company was in 1944, when he left Vanadium Corp. of America's Niagara Falls, N. Y., chemical and metallurgical laboratory.

Studders holds a B.S. degree in chemistry, graduating in 1941 from Niagara University's school of engineering. He is a member of the American Chemical Society.

Announcement is made by E. F. Houghton & Co., Philadelphia, of the appointment of **Dr. Kurt C. Frisch** as assistant manager of research. Dr. Frisch was graduated from the University of Brussels in Belgium and awarded his Ph.D. degree in Organic Chemistry at Columbia University. He has been supervisor of Organic Research in the Houghton Laboratories since 1952.

He will be succeeded in that position by **Dr. Ellis Abrams** who was educated at the University of Pittsburgh and was formerly supervisor of Textile Research for the Quaker Chemical Products Corporation.

Clement Wells, founder and president of Sarco Company, Inc. and Sarcotherm Controls, Inc., has retired to live abroad. The management and operation of the companies have passed to the same executives who have served as directors for many years, and who have a total of more than 150 years of service with the companies.

Simmons

Barfus

These directors are: **L. Barfus, H. F. Collins, R. W. Cumming, A. Milnes, J. Service** and **H. L. Simmons.**

The new officers are: Sarco Company, Inc.—President and Treasurer, H. L. Simmons; Vice Presidents, R. W. Cumming and A. Milnes; Assistant-Treasurer, L. Barfus; Secretary, **M. Mohr.**

Sarcotherm Controls, Inc.—President and Treasurer, L. Barfus; Vice President, **R. Stevens;** Assistant-Treasurer, H. L. Simmons; Secretary, **F. Schneiderman.**

P. A. Burns, District Sales Manager for Hewitt-Robins Inc. in Cleveland, has been appointed Manager of Sales at the Company's conveyor machinery manufacturing plant in Passaic, N. J.
A. J. Ball, Sales Engineer in Detroit, will succeed Burns as Manager in the Cleveland district.

Burns joined Hewitt-Robins in 1941 as a draftsman. Two years later he was made a field engineer, followed later by his promotion to the Cleveland managership. In his new position, he will be responsible for all sales activities and customer service at the Passaic plant.

Ball has been associated with Hewitt-Robins since 1947, starting in the company's Chicago office and later transferring to Detroit where he is well known in automobile circles. In his new position in Cleveland he will be responsible for the sale of industrial rubber products, conveyor machinery, vibrating equipment and other industrial products.

Michael Tato, who has been in the job plating line for the past twenty-six years, is now sales representative for Palumbo Bros. Inc. of 347 Ferry Street, Newark, N. J., one of the larger plating shops in the Metropolitan area.

ANNOUNCING: New VS-3 HONITE Barrel Finishing Machine

MORE CONVENIENT...EASIER TO MAINTAIN...LOWER COST

Here's the newest addition to the HONITE line of barrel finishing machines! More convenient . . . easier to maintain . . . lower cost, yet it retains *all* of the same precision construction features of established DV-3 and DV-5 models. It's designed with your needs in mind. It meets the most rigid safety requirements. With the all-new HONITE Barrel Finishing Machine, you have a choice of three motors; the 1½ h.p., for normal applications, the 2 h.p. for all but the heaviest jobs, the rugged 3 h.p. for super heavy-duty requirements. Note that the motor, speed reducer, speed changer and magnetic brake are mounted as a single compact unit, located well away from water and dirt, and completely protected from accidental damage by hoist pans, hoists and swinging objects.

☐ Pivoted safety gate —no slides or rollers to stick or jam.

☐ All lubrication points are open and accessible.

☐ Handy height controls, switches and speed changer located at right side of barrel. No stooping — no stretching.

☐ Cylinder can be removed from the front without disassembly.

☐ Steel frame absorbs drive stresses without transmitting shock to supports.

☐ Oversize pillow blocks and self-aligning bearings carry full loads of steel burnishing media.

☐ Chain guard covers drive even when safety gate is raised.

☐ Shafts are jig-bored for cylinder mounting to insure alignment on axles within .005".

☐ Plenty of space under the barrel to speed unloading. Two hoist pans can be used if necessary.

WANT MORE INFORMATION?

Honite® BRAND

Minnesota Mining and Mfg. Co.
Dept. P-35, St. Paul 6, Minn.

I'd like to talk to a HONITE Methods Engineer about the new HONITE Barrel Finishing Machine.

Name.....Title.....

Company.....

Address.....

City.....Zone...State.....

Made in U.S.A. by Minnesota Mining and Mfg. Co. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ont. Export: 99 Park Ave., New York City. Makers of "Scotch" Pressure-Sensitive Tapes, "Scotch" Brand Magnetic Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

GERMANIUM RECTIFIERS PERFORM WITH TOP EFFICIENCY

Udylite Tests Reveal Amazing Current Conversion Efficiency

This air cooled germanium cell with a rectifying surface the size of a dime will handle a 250 ampere load in a three phase circuit continuously and three years of tests show no detectable power losses. Including heat-radiating fins, it takes up just 8 cubic inches of space and weighs only 12 ounces.

Udylite in cooperation with the General Electric Company, now proudly introduces its new group of germanium rectifiers. Years of research and testing have proven that no other metal known offers the high efficiency of germanium as a rectifier material.

In operations calling for medium to high voltages, such as barrel plating, anodizing or chrome plating the efficiency of germanium soon pays the cost since the efficiency of a 3-phase germanium cell is *98* to *99 percent.*

Even at high loading germanium has less than one-volt drop in the forward direction. As for reverse current, germanium is again particularly good, having a reverse-to-forward resistance ratio of 400,000 to 1. Furthermore, Udylite germanium rectifiers require little maintenance and can be located in areas of minimum ventilation.

For further information regarding germanium rectifiers—prices, deliveries and specifications—consult your Udylite representative or write today direct to:

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

WORLD'S LARGEST PLATING SUPPLIER

Personals

Paul D. Sullivan has just been named assistant sales manager according to an announcement by **J. E. Heuser,** general sales manager, Le Roi Division.

Sullivan

Sullivan will headquarter in Milwaukee moving from New York where he has been in charge of contractor sales since joining the Le Roi Division of Westinghouse Air Brake Company more than a year ago. He will be concerned primarily with promoting the sale of Le Roi portable air compressors and Westinghouse stationary air compressors, both manufactured by Le Roi Division in Milwaukee.

After graduation from Mt. Angel College in Oregon, he worked as a civil engineer for 14 years in the Northwestern and Southeastern sections of the country.

John Sedlacsik, owner of Scientific Electric, has appointed **Marcel Pouilly** manager of the company's Ionic Spray Division. Pouilly will be stationed at Scientific Electric's Garfield, New Jersey plant, which manufactures Induction and Dielectric Heaters and Spot Welders, as well as Micro Pressure Ionic High Potential Paint Spray Equipment.

Pouilly

Long distinguished in the finishing industries for his work with spray equipment manufacturers, Pouilly was recently owner of The Illinois Spray and Equipment Company, distributors of Scientific Electric products.

Oliver A. Gottschalk, formerly assistant controller of The Carborundum Company, has been appointed assistant to the president, it was announced by **General Clinton F. Robinson,** president of the company.

In his new position, Gottschalk will assist the president in the general management of the business, conduct special investigations and studies and make recommendations on company policy and administrative matters.

Personals

After receiving his M.B.A. degree from Harvard University Graduate School of Business Administration, he was consecutively cost accountant for Joy Manufacturing Company at Evanston, Illinois, assistant secretary and assistant treasurer of Colonial Airways Corporation, and financial administrator in the Federal Works Progress Administration. From 1942 to 1946 he was in the Armed Forces and at the time of his retirement, Colonel Gottschalk was deputy director control division of the Army Service Forces. In 1946 he re-entered the business world as vice-president, controller, and a director of Lehigh Warehouse and Transportation Company, Newark, New Jersey, the position he held until joining Carborundum in 1953.

R. O. Hull, President of R. O. Hull & Company, Inc., Rocky River, Ohio, manufacturers of electroplating specialities, announces the appointment of **Joseph L. Jackson** to Head of Research and Development. Jackson received his Bachelor of Science degree in chemistry from the University of Michigan in 1948 and his Master's degree from Case Institute of Technology in 1952. Previous to joining the Hull Co., he was engaged in research for the past six years at the laboratories of the National Advisory Committee for Aeronautics at Cleveland, Ohio.

Jackson

L. A. Critchfield has joined the sales and service department of R. O. Hull & Company, Inc., manufacturers of electroplating specialties, as technical representative serving southern Ohio, Kentucky and West Virginia. Roy Critchfield brings to platers in that area his wide experience in plating production and supervision as well as his well qualified background in the territory as a field service engineer. Headquarters for the area are in Dayton, Ohio.

Critchfield

UDYLITE BRIGHT NICKEL PROCESSES

THE UDYLITE BRIGHT NICKEL PROCESSES

The Result of 20 Years of Research and Consistent Improvement

Exceptional brightness and leveling, with great operational stability and simplicity of control characterize the Udylite Bright Nickel Processes.

Produced by Udylite Research, these patented processes have for years been accepted the world over as the standards for quality plating. All Udylite processes are constantly being improved by the Udylite Research Corporation with its fine facilities and outstanding staff. These three Udylite Bright Nickel processes are most generally in use today.

No. 31 is a high speed process with highly stable brighteners and wetting agent. It is economical to use and exceptionally trouble-free in yielding the most ductile and lowest stressed bright nickel deposits.

No. 31H process is the same as No. 31 except it operates in the high chloride type bath to permit even higher speed plating. It is exceptionally tolerant to zinc and iron impurities.

No. 41 process is used where high leveling and brilliance must be obtained with minimum thickness of nickel. This process has the widest bright plating range of any bright nickel bath down to the very low current density of deeply recessed parts. An exceptional bath for the plating of zinc die-castings.

Udylite welcomes comparison of its processes to all others. Send us a sample of the part to be plated and let us make recommendations. Write to:

WORLD'S LARGEST PLATING SUPPLIER

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

Personals

Clifford L. Christensen has succeeded **M. L. Richardson** (retired) as chief inspector for the Toledo Division of Dana Corporation, it has been announced by **J. H. Jones,** plant manager.

Christensen

Chief inspector at Toledo is responsible for the quality of all materials purchased for and produced by the division, and directs a departmental staff numbering approximately 110.

Appointed in turn by Christensen are two assistant chief inspectors: **Brainard A. Barley** and **Ward W. Wright.**

Christensen joined Dana in 1929 as a gear quality inspector and subsequently progressed through various promotions in the inspection department. Since 1948 he has been assistant chief inspector.

Secretary of the Toledo section, American Society of Quality Control, Christensen has also been active in the Foremen's Club of Toledo, directing that organization's series of meetings on Modern Materials and Methods of Production.

Barley also joined the corporation's inspection department in 1929 and, during the war years, completed a course in machine shop inspection, and applied mathematics at the University of Toledo.

In his new position he will supervise inspection of all purchased material, receive and review customers' complaints, supervise the salvage department and inspection of returned materials, and act in a liaison capacity with the engineering department.

Wm. E. Butts, president of General Metals Corporation, has announced the appointment of **Philip F. Thayer** as vice-president of that firm and general manager of its Metals Division operating foundries, forge, and pipe fittings plants in Oakland, Los Angeles, and Houston.

Thayer

Thayer was general manager of Willamette Iron & Steel in Portland, Oregon, for the past six years. Prior to this connection, he has held top management positions with leading west coast companies for many years.

General Metals Corporation, a subsidiary of Transamerica Corporation, has recently completed a modernization and construction program at its plants in Oakland, Los Angeles, and Houston, and is now aggressively broadening its sales coverage in the West.

The Kocour Company of Chicago, Ill., manufacturers of buffing, and polishing compositions, rectifiers, analytical sets and instruments and distributors of Roberts Rouge Company's greaseless finishing compounds, announces the appointment of a new sales representative, **Norman K. Meyers,** in the state of Michigan.

Meyers

Meyers will operate from his home at 2140 Brickley, Ferndale, Michigan and will service the area within 150 miles of Detroit. He is well prepared to service this area with a background of nine years of diversified plating and metal finishing experience. He has served in such capacities as chemist, process engineer, productions supervisor, research and the sale of buffing composition with prominent firms in the industry.

The retirement of **E. D. Treanor,** nationally-known engineer and pioneer in the development of small, light, and efficient distribution transformers was announced recently by **F. L. Woods,** manager—engineering, Distribution Transformer Department, General Electric Co., Pittsfield, Mass. At the same time Woods announced the appointment of **W. A. McMorris** as consulting engineer to succeed Treanor.

Now... get more for your anode dollar!

NEW ANACONDA "PLUS-4" ANODES*

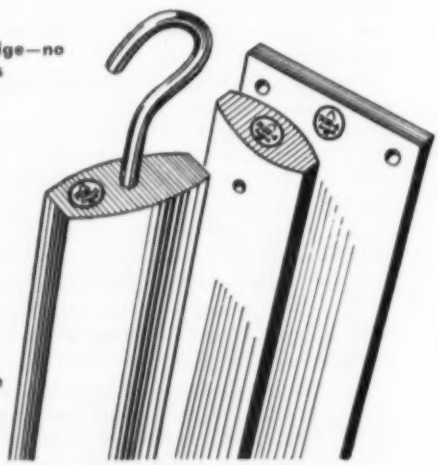
(PHOSPHORIZED COPPER)

+1 Freedom from anode sludge—no "bagging" or diaphragms required.

+2 No copper build-up in solution.

+3 Exceptionally smooth, heavy cathode deposits.

+4 10% to 15% more cathode deposits per pound of anode.



It has been discovered that carefully controlled amounts of phosphorus, together with minute amounts of other elements in electrolytic copper, make anodes of vastly superior quality for acid plating. ANACONDA "PLUS-4" Anodes are available in all the standard sizes and forms at no increase in cost over ordinary anodes. Look for the stamp "PLUS-4" on the anodes you buy.

We'll be glad to supply additional information, in detail, without obligation. Just write to: The American Brass Company, Waterbury 20, Conn.

*For use under Patent No. 2,669,216 54160

ANACONDA® "PLUS-4" ANODES made by THE AMERICAN BRASS COMPANY

ALWAYS FINISHES FIRST

and cuts costs two ways because it's completely automatic!

fast cutting, easy cleaning with

Liquimatic®

the perfect liquid compound for all metal finishing

What are the two big cost factors in your buffing room? Chances are *buff life* figures big when you're talking production costs . . . and the second big factor is *production time* itself. Liquimatic Application Systems are licking these two cost problems in buffing rooms all over the U. S.—because Liquimatic is automatic. An electrically timed system feeds Liquimatic Buffing Compound to the buff in the exact amount to give you the exact cut you need. Because the buff is continually lubricated, buff life is extended up to 400%!

And with Liquimatic there's no compound wasted, no nubbin problem, no hand application, no changing bars —think of the cost savings you can effect in *your* buffing room with these advantages! Savings in buff life alone can soon pay for a complete Liquimatic Application System . . . a system that will continue to save you money — *automatically*.

Check the other features of Liquimatic Buffing Compound . . . then write today for your free copy of Liquimatic's big, new folder that tells the whole cost-saving story of Liquimatic in *your* buffing room.

These additional Liquimatic features mean real savings in terms of time, money, safety—

- longer buff life
- completely automatic
- fast cutting
- easy cleaning
- non-settling
- high flash point
- long storage life
- sprayable viscosity
- adhesive slow-wearing buff face

Liquimatic *. . . gives more buff mileage*

PLATEMANSHIP

Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

HANSON-VAN WINKLE-MUNNING COMPANY

Main Office and Plant, Matawan, New Jersey

J. C. Miller Division, Main Office and Plant, Grand Rapids, Mich.

SALES OFFICES: Anderson (Ind.) • Baltimore • Beloit (Wisc.) • Boston Bridgeport • Chicago • Cleveland • Dayton • Detroit • Grand Rapids • Los Angeles • Louisville • Matawan • Milwaukee New York • Philadelphia • Pittsburgh • Plainfield • Rochester St. Louis • San Francisco • Springfield (Mass.) • Utica Wallingford (Conn.)

H-VW-M

INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES

Personals

Appointment of **A. W. Rout** as field sales representative of Fielden Instrument Division of Robertshaw-Fulton Controls Company was announced by **Ralph M. Stotsenburg**, division sales manager.

The division is a producer of electronic controllers and industrial instrumentation.

Rout will cover the northern half of Ohio and several counties in northwest Pennsylvania. He will operate from the division's Cleveland sales office.

Rout is a veteran of 16 years in the industrial instrumentation field.

Heil Process Equipment Corp., Cleveland, manufacturers of chemical-proof equipment such as tanks and tank linings, anodes, heat exchanges, etc., announce

Veit Stotsenburg

the appointment of **Peter L. Veit** as direct sales engineer to cover the eastern states. His headquarters are at 152 W. 42nd St., New York.

Veit formerly was associated with Grumman Artcraft Engineering Co. as a process engineer. He is also well known throughout the plating industry, having contributed articles on subjects pertinent to that industry. He is a member of the American Chemists Society, American Society for Metals, and is an active officer of the New York branch of the American Electroplaters' Society.

Promoted to chief engineer of the company is **Fred W. Arndt.**

Arndt, in his new capacity as chief engineer, has had wide experience in all phases of sales and engineering in the process equipment field. He received his chemical engineering degree from Pratt Institute and his M.S. degree from Stevens Institute of Technology. He is a member of the Cleveland Engineering Society.

Nice Product, Nice Package

Folks often wonder why we spend an extra ¼¢ a pound out of our own pockets for a lithographed drum. Fact is we're proud of the quality of BFC Chromic Acid and figure it deserves a bright, colorful container.

Every batch gets checked against a tough quality spec. Off-grade acid goes on the dump. Only top-quality material goes into those shiny BFC drums. Send us a modest order and see for yourself.

BETTER FINISHES & COATINGS, INC.

268 Doremus Ave., Newark 5, N. J.

122 East 7th St., Los Angeles 14, Calif.

International Rectifier Corporation, California, is pleased to announce the addition of **A. R. Hunter** to their Application Engineering staff.

Hunter received his Electrical Engineering and B.S. degrees from Iowa State College in 1946. He was formerly employed by the Wagner Electric Corporation, Los Angeles, California, serving that company for seven years as an outside Sales Engineer for electric motors and transformers.

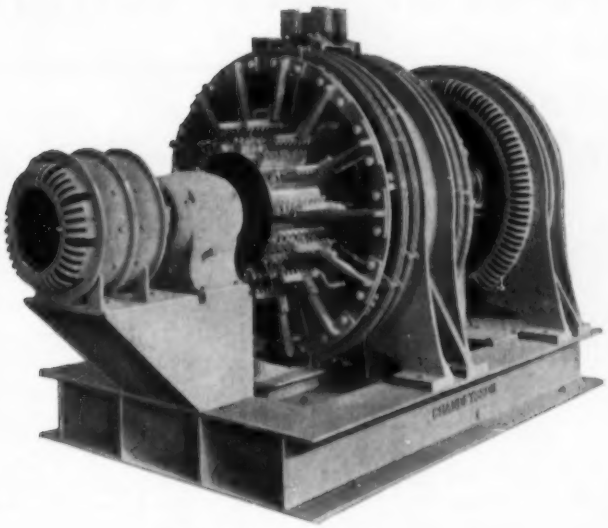
Hunter will serve the International Rectifier Corporation in the capacity of Sales and Application Engineer for the company's wide range of selenium and germanium semi-conductor devices.

W. E. Noyes, vice-president in charge of Sales for The Diversey Corporation, Chicago, recently announced the appointment of **Myron T. Bennett** to Promotional Manager of the Metal Industries Department.

Bennett previously was General Manager of the Spec-Kem Company, a division of The Diversey Corporation, supplying special chemical compounds to government agencies.

In his new capacity, Bennett will direct the sales of Diversey's fastest growing department. Recent developments by Diversey laboratories in the field of metal processing have resulted in new production economies, advanced processes and outstanding products. Plans for the future include research and development of still better processing methods and products.

The directors of The Seymour Manufacturing Company have announced the election of **Robert M. Terry** as president of the company to succeed **Alton G. Wentworth** who resigned that position on February 1.



Since 1904 . . .

HELPING PROVIDE
THE POWER BEHIND AIRPOWER

Chandeysson MOTOR-GENERATORS

. . . low-cost, high-efficiency power conversion for plating and anodizing

Original Chandeysson units built almost half a century ago continue to give flawless service today. One reason for this sturdiness and dependability is the extra overload capacity built into Chandeysson Motor-Generators. They can carry loads far in excess of their rated capacity for long periods of time without damage.

Another reason for the growing acceptance of Chandeysson units over the years is their unusually high operating efficiency. In aircraft plants, where you may need extra capacity to meet emergencies, Chandeysson Generators will never let you down.

For more information, please write:

CHANDEYSSON ELECTRIC COMPANY • 4078 Bingham Avenue, St. Louis 16, Missouri

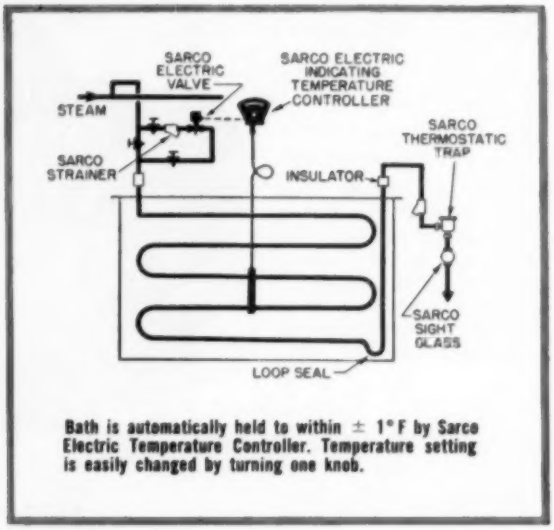
937

How control of tank temperatures

improves product quality—

cuts operating costs

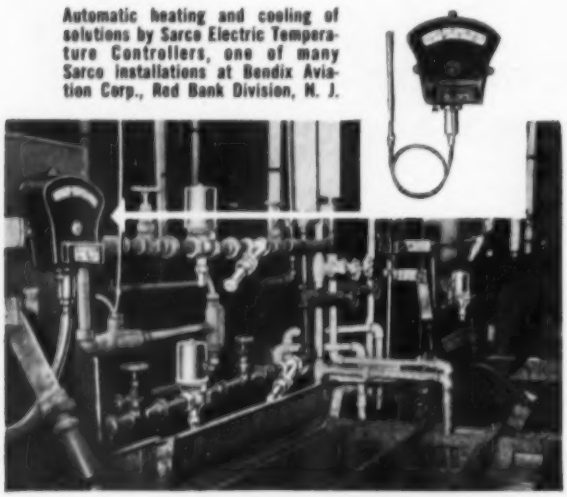
3 ways



Bath is automatically held to within ± 1°F by Sarco Electric Temperature Controller. Temperature setting is easily changed by turning one knob.

HERE'S HOW! Sarco electric temperature controllers soon pay for themselves by eliminating the inherent wastefulness of manual controls. Completely automatic operation saves plating materials, insures quality control by keeping temperatures where they belong at all times. Your tank-operating costs are cut three ways:

Automatic heating and cooling of solutions by Sarco Electric Temperature Controllers, one of many Sarco installations at Bendix Aviation Corp., Red Bank Division, N. J.



1. **You lower rejects** because solutions are held automatically to plus-minus 1°F. No chance for human error to mess up a tankload . . . and cut into profits.

2. **You save plating solutions** because automatic control prevents boil-off caused by creeping temperaure.

3. **You save steam** because you use only enough to keep bath at proper temperature.

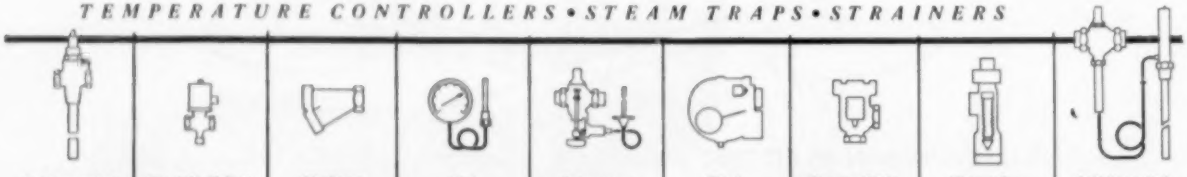
You can equip your tanks with a Sarco Electric Temperature Control System for as little as $130 a tank. Sarco controllers not only hold temperatures automatically but also indicate the temperatures being maintained and are easily adjustable for different jobs.

For complete information on the advantages of Sarco temperature controllers, write for Technical Bulletin No. 6. Sarco Company, Inc., Empire State Building, New York 1, N. Y. Representatives in principal cities.

SARCO

improves product quality and output

TEMPERATURE CONTROLLERS • STEAM TRAPS • STRAINERS



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ATTRACTIVE
MODERN
DURABLE
ECONOMICAL

Satin Finish for

SCHLAGE NOVO
Satin Finished Wrought Bronze using Lea Compound 831.

SCHLAGE SATURN
Satin Finished Aluminum using Lea Compound 831.

SCHLAGE®
LUSTER-SEALED
ALUMINUM LOCKS

Here's a beautiful line of modern locks . . . LEA SATIN FINISHED for consumer eye appeal. It's a finish that's economical to produce. It's a finish that's extremely durable in hard use. It's a finish that's modern. It may be just the finish for your product.

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serving the Finishing Field
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Lea-Michigan, Inc., Detroit
Lea-Ronal, Inc., Long Island City, N. Y.
Lea Mfg. Co., of Canada, Toronto
Plating Polishing Buffing Burring

If you have a finishing problem why not call on LEA . . . our many years of technical research and practical shop experience are at your service.

LEA CHAMPION
POLISHING WHEEL CEMENT
matching the high quality of other Lea Products, is now obtainable through
LEA-MICHIGAN, INC.
14066 Stansbury Ave., Detroit 27, Mich.

Burring, Buffing, Polishing, Lapping, Plating and Spray Finishing . . . Manufacturers and Specialists in the Development of Production Methods, Equipment and Compositions.

Manufacturers of Lea Compound and Learock . . . Industry's quality buffing and polishing compounds for over 30 years.

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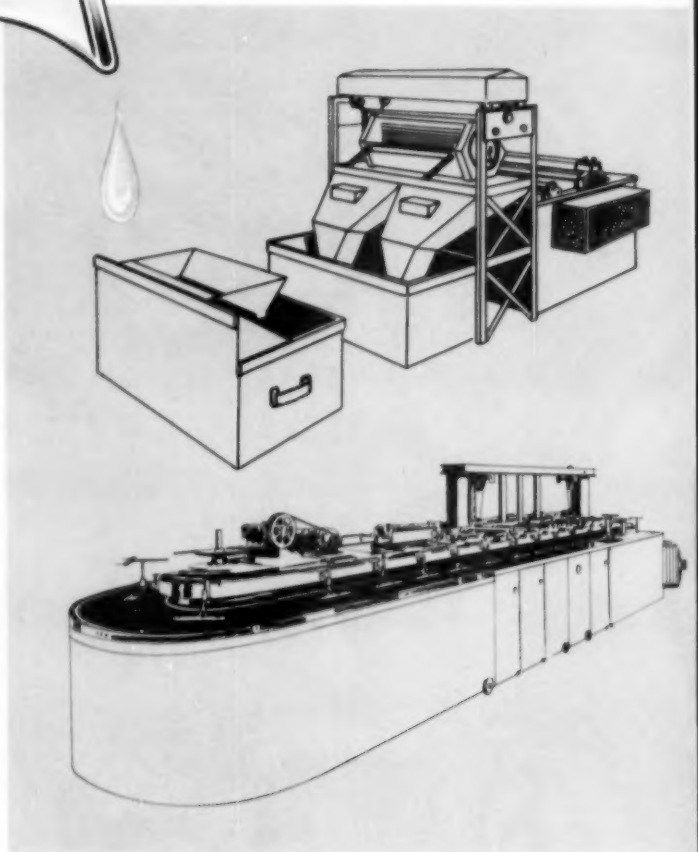
. . . looking for improved results from your cyanide copper solution?



SUPERTARTRAL, industry's proved replacement for Rochelle Salts and Potassium Tartrate in *any* cyanide copper plating operation, offers the following advantages:

SUPERIOR Anode Corrosion, making maximum use of plating metal.

SUPERIOR Tolerance to numerous metallic impurities such as Chromium, Calcium, Barium, Magnesium, etc.

SUPERIOR Deposits with less tendency for roughness, caused by metallic impurities such as might be introduced with hard water.

SUPERIOR Cost Savings when used at recommended concentration; where operating characteristics of standard and bright baths utilize Rochelle Salts at 6 oz./gal., SUPERTARTRAL offers 20% savings over Rochelle Salts and 23% saving over Potassium Tartrate.

SUPERIOR Cyanide Stability . . . Lea-Ronal SUPERTARTRAL reduces cyanide breakdown with its resultant carbonate formation.

SUPERTARTRAL has been thoroughly and successfully production tested in still tank and barrel installations of conventional and bright cyanide copper processes, including the widely used Lea-Ronal Bright Copper Process.

LEA-RONAL Products are the result of careful research and development which guarantees that they are not put on the market until ready.

Your constant search for improving plating operations and for lowering costs, warrants thorough investigation and trial of LEA-RONAL SUPERTARTRAL.

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REPORTS from all over

. . . stripped, cleaned and degreased

(This section is especially compiled for the readers of PLATING; here the world in which we work and operate is stripped of its veneer, cleaned of its distortions and carefully degreased of superfluities).

Business activity is being pushed up. Strong consumer demand, rise in manufacturers new orders, inventory rebuilding, rising production, counterseasonal rise in factory hiring, steady gains in income, and others contribute to this rise. The biggest force is the sizzling rate of car output is now at a rate of 7½ million per year.

METALS—Late in January the copper price (domestic) was up three cents/lb; aluminum up one cent/lb. In general, the metals show an increase in price. (E&MJ) index of nonferrous metal prices is up to 187.74 for January vs 187.45 for December. Quotations on all metals stand:

ALUMINUM—(99 per cent pure plus ingot)	22.880
ANTIMONY—Five tons or more but less than carload	31.970
Bulk	28.500
In cases (Port Laredo)	29.000
CADMIUM—Producers' quotation	170.000
Producers' and platers' quotation	170.000
Platers' quotation	170.000
COOPER—Electrolytic, domestic	29.783
Electrolytic, export	32.574
GOLD—(per ounce U.S. price)	$35.000
LEAD—Common, New York	15.000
Common, St. Louis	14.800
MAGNESIUM—(ingot)	27.000
MERCURY—(per 76 lb flask)	$322.000
NICKEL—(F.O.B. Port Colborne U.S. duty included)	64.500
PLATINUM—(refined per oz)	$79.500
SILVER—New York, per/ounce	85.250
London, pence/oz	74.238
TIN—New York	87.290
New York, 99 per cent min.	86.290
ZINC—Prime Western (E St. L.)	11.500
Prime Western (delivered)	12.000

OUTLOOK—Interest on long-term Government bonds are at the highest level in more than a year. . . . Year-long decline in interest on commercial paper has reversed. . . . Nearly three million children of school age are not in school because of shortages of teachers and classrooms. . . . The record $335 million St. Lawrence power project bond issue was snapped up in one day. . . . Airline's passenger-mile traffic now exceeds railroad coach passenger mileage. . . . Industrial production is now above year-earlier levels. . . . Nearly 96 per cent of aircraft industry business comes from the Government. . . . Production of anthracite coal is 25 per cent below last year's poor level: one area where there's talk of depression. . . . Farm parity recently sank to 86 per cent, the lowest since 1941 . . . People spent more on cars and car upkeep last year than they did on food. . . . President Eisenhower will request powers to tighten mortgage terms. . . . Increasingly bitter struggle between co-op credit unions and commercial lenders. . . . Many unions to seek "catastrophe" benefits to cover protracted sicknesses. . . . Retailers, more and more will set their own prices—regardless of manufacturers suggested prices. . . . Also more retailers will emphasize profitable sales, even if it means less volume.

This issue deals largely with research. An intelligent guess at the cost of research this year based on trends and incomplete 1954 figures:

Armed services	1.3 billion
Other government agencies	0.8 billion
Industry	2.0 billion
	4.1 billion

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AES Research Reports

Publications originally appearing in THE MONTHLY REVIEW and PLATING, reprint of which may be obtained from the office of the Executive Secretary, 445 Broad Street, Newark 2, N. J., at the prices listed.

Reprints Serial No.	*Price* $	*Title*	*Authors*
1	0.60	Adhesion of Electrodeposits, Parts I, II, and III	A. L. Ferguson & E. F. Stephan
2	0.40	Adhesion of Electrodeposits, Part IV	A. L. Ferguson
3	0.50	Determination of Impurities in Electroplating Solutions, Parts I-VI	E. J. Serfass & W. S. Levine
4	0.35	Stripping of Copper from Various Base Metals, Parts I and II	F. C. Mathers C. E. Landwerlen & E. L. Martin
6	1.25	Determination of Impurities in Electroplating Solutions, Parts VII-XIV	E. J. Serfass and Co-workers
9	0.75	Disposal of Plating Room Wastes	B. F. Dodge & D. C. Reams, Jr.
14	1.00	Disposal of Plating Room Wastes	B. F. Dodge & D. C. Reams
15	0.90	Effect of Impurities and Purification of Electroplating Solutions	D. T. Ewing & W. D Gordon
16	1.00	Determination of Impurities in Electroplating Solutions, Parts XV-XIX	E. J. Serfass & Co-workers
17	1.00	Porosity of Electrodeposited Metals	N. Thon, Denis Keleman & Ling Yang
19	0.65	Analytical Methods for the Determination of Cyanides and Cyanates in Plating Wastes and in Effluents from Treatment Processes	B. F. Dodge, W. Zabban, E. J. Serfass, & R. B. Freeman
20	1.25	Physical Properties of Electrodeposited Metals	V. Zentner, A. Brenner & C. W. Jennings
21	1.30	Polarization and Overvoltage	R. A. Schaefer & W. King
22	1.75	Disposal of Plating Room Wastes, III and IV	B F Dodge & W. Zabban
23	1.25	Effect of Impurities and Purification of Electroplating Solutions. I. Nickel Solutions, Parts 3, 4, 5 and 6	D. T. Ewing and Associates
24	0.75	Current and Metal Distribution in Electrodeposition, I, II & III	J. Kronsbein
25	1.35	Disposal of Plating Room Wastes, V & VI	C. A. Walker & W. Zabban
26	3.50	Cleaning and Preparation of Metals for Electroplating, IV, V, VI & VII	H. B. Linford E. B. Saubestre
27	1.35	Methods for Testing Thickness of Electrodeposits, II & III	H. J. Read & F. R. Lorenz

Two books, "Principles of Electroplating and Electroforming" by Blum and Hogaboom and "Modern Electroplating" by Allen G. Gray are offered for sale through your national headquarters:

The first, $5.95 to members
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The second, $7.22 to members
8.50 to non-members

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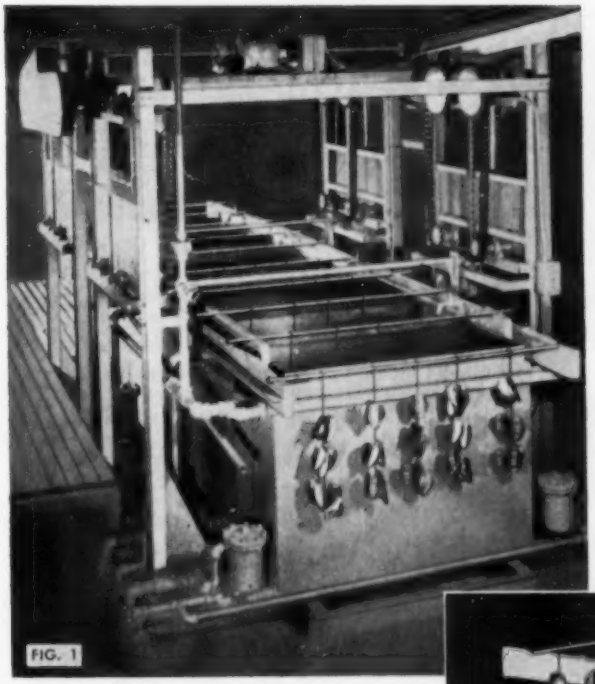
FIG. 1

NEW Automatic TRANSFER MACHINE for Pre-Plate Processing

One unit saves labor of 3 to 6 men.

Extremely flexible—different metals such as steel, brass and even die casting can be processed with the same set-up.

Shops that have BELKE Automatic Transfer Machines use them for most of their work.

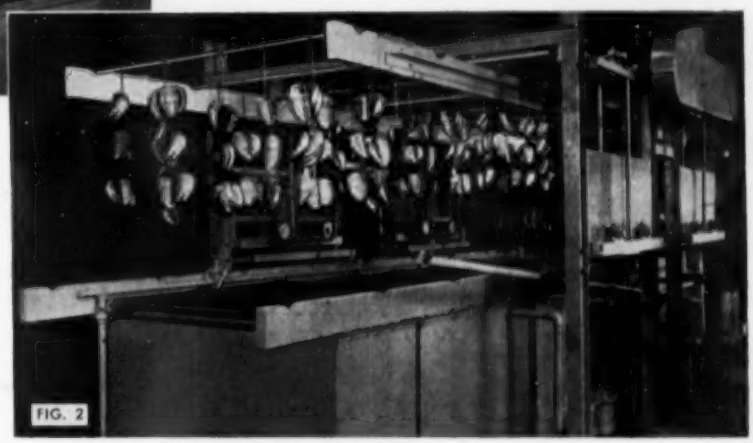
FIG. 2

Fig. 1. Loading End. Loaded racks are hung on rod placed in saddles on transfer frame. At end of each processing period the machine automatically lifts all rods and advances each one tank in the processing cycle.

Fig. 2. Delivery End. Picture shows transfer frame elevated in the transfer operation. When the frame comes down the last rod, which carries parts from the last tank in the processing cycle, will be placed in the unloading saddles on the frame which extends beyond the last tank.

Features

- Affords practically any required cycle for plating, painting, etching, etc.
- Flexible. Easily adjusted to "skip" tanks for processing articles of different basic metals without changing solution.
- Automatic Timing. Easily set for any processing period from 10 seconds to 20 minutes.
- Uniform Processing. The automatic timer doesn't forget — is not called away. Spoilage is avoided.
- Helps Foreman maintain full production. At a glance he can see partially loaded rods or empty saddles—then locate the cause.
- Available with conveyor-equipped plating tank to which processed work is automatically transferred.

The BELKE Automatic Transfer Machine stops the backaches and high labor costs of processing parts for plating.

The machine automatically lifts and transfers work from tank to tank through the entire pre-plating cycle such as electrocleaning, tepid running rinse, anodic electroclean, cold running rinse, acid bath, cold running rinse, cyanide bath, cold running rinse. Practically any cycle can be had.

The Transfer Unit can be adjusted to "skip" tanks as desired for processing articles of different metals such as steel, brass and die castings. This flexibility makes practical automatic processing of a great range of varied work.

For further labor-saving, a conveyor-equipped plating tank can be furnished with the BELKE Transfer Unit. The Transfer Unit automatically transfers processed work to the conveyor and the work is completely plated while moving through the plating tank.

Send for literature or see your BELKE Service Engineer.

Belke Manufacturing Company, 947 N. Cicero Ave., Chicago 51, Ill.

EVERYTHING FOR PLATING PLANTS

INCREASE YOUR PRODUCTION WITH KOCOUR PLATING TEST EQUIPMENT

All successful platers know that using KOCOUR plating test equipment means better plating, more production, lower costs, increased profits.

● The KOCOUR Sulfate Test Set enables anyone to accurately and quickly determine the sulfate content of a chromium plating bath in order to maintain a constant check on the ratio of sulfates to chromic acid. . . . This is important to insure consistently good plating results. . . . The entire test takes about 7 minutes . . . no calculations are necessary.

● The KOCOUR Chromic Acid Test Set was designed to accurately and simply determine the chromic acid content of chromium solutions. While a hydrometer is sometimes used for this determination, if close control is desired, the solution should be analyzed.

The set is self-contained . . . reads directly . . . is accurate to the one-half ounce per gallon of chromic acid . . . one simple subtraction is the only necessary calculation.

● Many platers use the KOCOUR Set "CR" for determining trivalent chromium in chromium solutions. The importance of this set is that a chromium solution high or low in trivalent chromium is not only expensive to operate but also is the cause of much spoiled work. The set is simple to operate . . . cost of upkeep small . . . no calculations are necessary.

● KOCOUR are specialists and pioneers in testing equipment for controlling plating — cleaning — pickling — anodizing — and hardening processes . . . special sets can be provided for your requirements.

Write today for further information—no cost or obligation.

KOCOUR COMPANY
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Industry's Abrasive
BONDING CEMENT
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IMPROVES PRODUCTION PER WHEEL OR BELT
PROLONGS ABRASIVE LIFE

• We're not asking you to commit yourself blindly with a large order. We do suggest that you place a *trial* order for GRIPMASTER . . . a 75 pound pail or a package unit of 4 one gallon cans. Either will give you sufficient quantity to make a thorough competitive test. Then, if your production volume warrants, you can order GRIPMASTER in 660 pound drums.

When we ship your trial order, we'll let you know where our nearest distributor to you is located. Then you can deal directly with him and get his personal service on wheel and belt problems as well as other Lea products.

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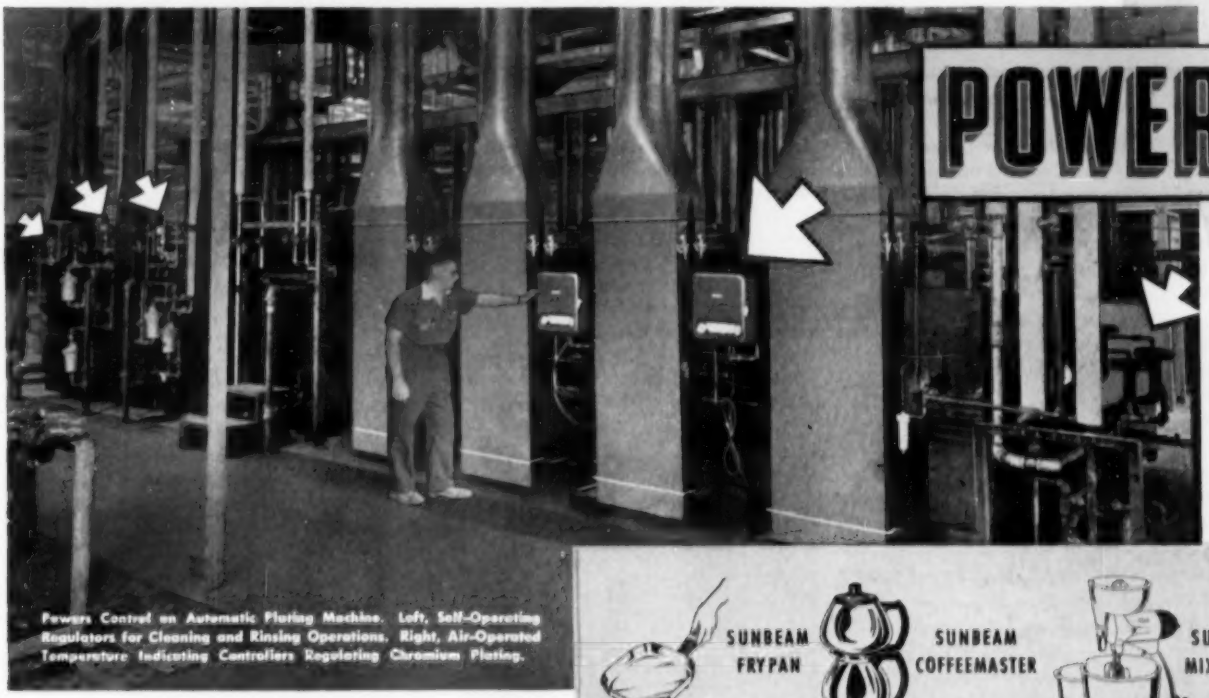


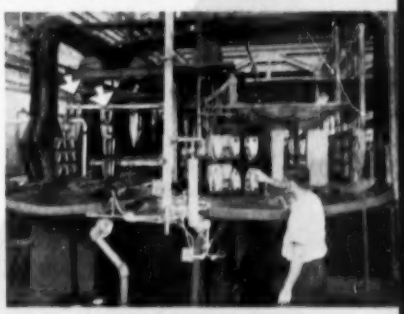
Powers Control on Automatic Plating Machine. Left, Self-Operating Regulators for Cleaning and Rinsing Operations. Right, Air-Operated Temperature Indicating Controllers Regulating Chromium Plating.

Sunbeam CORPORATION ASSURES HIGH-QUALITY VOLUME PRODUCTION FINISHING WITH POWERS TEMPERATURE CONTROLS

Metal finishing operations at *Sunbeam Corp.* are critical. A world-known reputation for quality appliances makes rigid final inspection essential. Yet, high-volume production must be maintained on modern automatic metal finishing equipment.

As an essential aid to high-quality, high-volume metal finishing operations, *Sunbeam Corp.*, uses Powers Temperature Control Equipment extensively throughout their Chicago and Canadian plants.

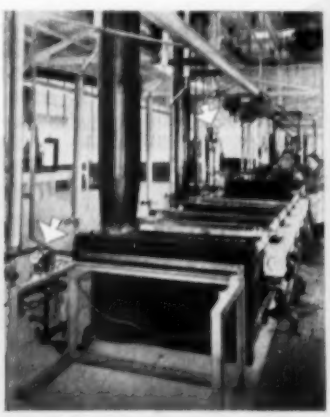
Powers Temperature Controls can help you, too . . . whether your plant be large or small. They'll help you turn out a better product, while saving you money. Contact the Powers office nearest you, or write us direct.

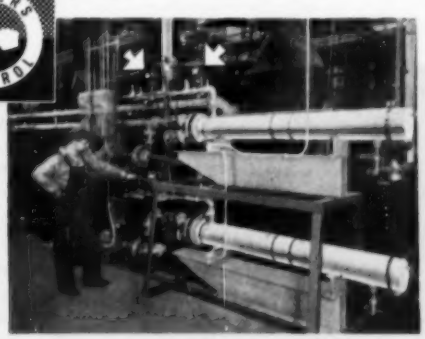


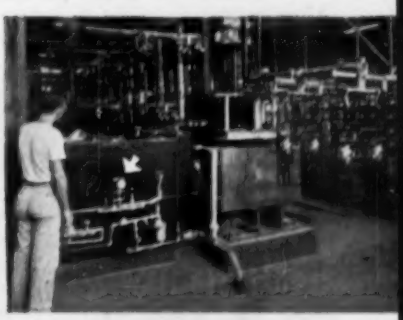
Above: Controls on Copper Plating Machine.

Right: Self-Operating Controls on Barrel Type Plating Machine.

Below: Controls on Heat Exchangers.







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Trade Literature

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L—300. Molybdenum Disulfide—"Properties And Uses of Pure Molybdenum Disulfide as a Lubricant," a four-page technical paper consisting of excerpts from other papers previously presented before the A.S.L.E., is now available from The Alpha Corporation.

Included is a general discussion of the principle of lubrication by solids and a well-illustrated description of the value of molybdenum disulfide in extreme pressure lubrication applications.

Featured is a series of industrial applications in which the margin of lubricating superiority of molybdenum disulfide can be expected to be large.

L—301. Cu Specifications—Publication of a tabbed, easy-to-use, 24-page reference manual containing the latest copper and copper-alloy specifications, is announced by The American Brass Company. Included in this completely revised edition are ASTM, ASME, AWS, SAE, AMS, Federal, Military, Army, Navy, and Joint Army-Navy specifications. The new index is divided into two sections. The first is a list of the most generally used alloys made by the company, together with the applicable specifications of the agencies. The second section lists specifications in numeric order with a brief description of the material as to alloy, grade, type, temper, anneal, etc.

Preparation of "Copper and Copper-Alloy Specifications Index" was prompted by the Technical Department of The American Brass Company because of the growing use by industry of standard specifications of the various national engineering societies and government agencies.

L—302. Vari-Set Proportional Mixer—A new bulletin, giving details and specifications of their Vari-Set Proportional Mixer with adjustable jet has just been completed by Eclipse Fuel Engineering Co., manufacturer of heat treating equipment.

A built-in adjustable orifice which gives any volume of perfectly proportioned gas and air is one of the outstanding features of these Vari-Set Mixers. There are no sleeves or jets to worry about—a Gas Selector adapts the mixer to all commercial gases. The new Eclipse butterfly valve, supplied as part of the Vari-Set assembly, has a visual indicating dial setting, with both high and low limit, for controlling the flow of air to the mixer.

L—303. Perforated Metals Catalog—A liberally illustrated new 114 page catalog has just been published by the Standard Stamping & Perforating Co., leading fabricators of perforated metals. The new catalog is pocket size, and spiral bound, for easy reference, and contains a wealth of useful information about perforated metal. The greatest number of pages are devoted to well organized, actual size illustrations of perforated metal samples. In addition, space is devoted to helpful buying information, the end uses of perforated

Standard's Designs

metal, manufacturing processes, and the background of Standard Stamping. Any one interested in the design or manufacture of products containing perforated metal will find this catalog an invaluable reference. It will also prove useful to product designers who are searching for new materials, because it demonstrates the versatility of perforated metal. Because of the tremendous amount of time and expense involved in the preparation of this catalog, only a limited number of copies are available, according to Standard Stamping officials.

L—304. Strippers—Enthone, Inc. have announced that a new four-page illustrated folder is available which describes Enthone Enstrips. These are materials for selective stripping of one metal from another. For example, nickel from steel or copper, tin or tin-lead from copper or steel, and copper from steel. A handy chart is given to enable easy selection of the proper stripper for any particular job.

L—305. Handbook on Polishing and Grinding With Coated Abrasives—A 60-page "Production Digest" of authoritative papers on coated abrasive grinding and polishing techniques, has just been published by Behr-Manning Corporation, to "help industry solve modern grinding and polishing problems and suggest new and practical methods." It constitutes the first known effort on the part of a coated abrasives manufacturer to compile a handbook of the art, and is assembled from 20 technical papers prepared by Behr-Manning methods engineers during the past two years for the leading periodicals of production engineering in both the metal-working and the wood-working fields.

Subjects covered include: coated abrasives theory and practice, contour polishing and grinding, the inside polishing of recesses and small openings, the conversion of polishing jacks to belt usage, contact wheels, part sizing and deburring, swing frame grinding, cylindrical stock grinding, abrasive belt lubrication, disc grinding problems, tolerance grinding of wide sheets, abrasive strapping techniques, special abrasive cloth shapes and their uses, the cutting of spiral-wound abrasive drum covers, the modern use of coated abrasives in wood finishing, and suggestions on cost cutting in production practice.

It is the Behr-Manning plan to issue future editions of its Production Digest as fresh material on yet uncovered subjects is published. Although the current first edition is the most complete assembly of information yet on the techniques of grinding and polishing with coated abrasives, Behr-Manning views the currently available volume as merely the beginning of a library sorely needed in a rapidly expanding field.

The material is set 2-column on 8½ in x 11 in format, and is illustrated with 122 photographs, 16 drawings and 4 tables or check lists. The authorities whose writings are assembled include E. E. Oathout, Dirck Olton, J. J. Durnan, J. Karl McLaughlin, Dr. Hugh N. Dyer and Harvey L. Bennett.

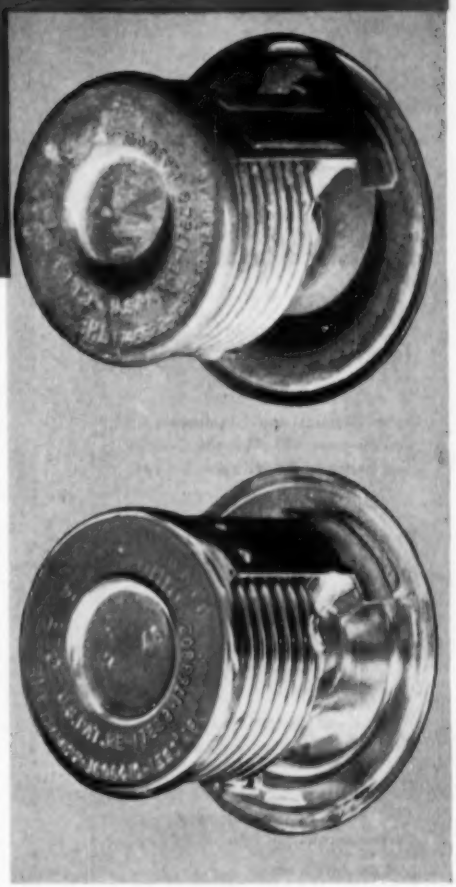
L—306. Abrasive Grain and Powders—The Carborundum Company has just published a new booklet "Abrasive Grain and Powders" for use in metal finishing. Packed with informative charts and illustrations, the booklet contains many of Carborundum's latest abrasive engineering recommendations. Topics include "Properties of abrasive grain and powders," "Elements of metal polishing," "Preparation and care of polishing wheels," and "General rules for good polishing." The 42 page booklet contains a suggested layout for set-up room and curing room and devotes a chapter each to metal buffing, metal tumbling, and pressure blasting.

Battelle

Chemical Polishing

a process that "brilliantizes"

smooths as it brightens,
brings out basic luster of metal...
chemical polishing will not etch!



Chemical Polishing is a dollar-saver in the bulk finishing of parts of intricate shapes, or of such small size that wheel-polishing is impractical.

The thermostat at right is typical—small, with grooves, depressions, and sections not accessible to buffing. Chemical Polishing produced a satisfactory, lustrous finish at low cost.

Hundreds of parts in many lines are similarly adaptable to this cost-cutting. As many as four steps have been eliminated in finishing an item. A chemical-polished surface can be plated over without other treatment.

These metals can be processed: brass, copper, nickel-silver, Monel, nickel, aluminum. Chemical Polishing requires only a tank and heating element. It is simple to install—operate—control.

For more information about Chemical Polishing write any of these distributors—all fully equipped to help you technically.

Ask for the new folder, FINISHING —WITH A PROFIT, which describes several Battelle-developed processes.

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  105 North 15th Street
  Louisville, Ky.
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  605-621 South 12th St.
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20XL CADMIUM BRIGHTENER—Without equal for superlative cadmium plating. Pays for itself many times over.

100 BARREL and 303 STILL ZINC BRIGHTENERS—for starlight bright zinc deposits.

PERMA-BRITE "S" (still or automatic) and PERMA-BRITE "B" (barrel) ZINC BRIGHTENERS—for most economical bright deposits.

ZINC PURIFIER—Keeps zinc bath in tip-top condition; minimizes brightener consumption.

RINS-AID—Added to rinse tank: Repels water; helps prevent staining; saves buffing—all at negligible cost.

HULL CELL EQUIPMENT—Essential to every plant. For bath control to give peak production and quality. Specially designed COMET, B-1000 and B-267 Rectifiers for proper Hull Cell tests and general laboratory use. Model "WT" Hull Cell now available for tests at elevated temperature. New Porcelain Hull Cell.

HANGING HULL CELL—A new development designed to make plating tests right in the plating tank, or through the complete sequence of plating operations.

CURRENTESTER—specially designed oscilloscope for platers to detect hidden defects or irregularities in rectifiers.

R. O. HULL & COMPANY, INC.

1302 PARSONS COURT ROCKY RIVER 16, OHIO

Trade Literature

Wyandotte's Guide

L—307. Use Guide for Metal Industries—A new guide to the use of Wyandotte Products for the metalworking and metal finishing industries has just been issued by Wyandotte Chemicals Corporation. Known as Form 2199, simple directions are given for 12 major cleaning, stripping or processing operations. Under the 12 operations, 40 recommendations are given for products that fit various plant conditions.

The list of major operations discussed includes: Barrel finishing, Cleaning and Phosphating, Deoxidizing, Oil and Water Absorbent, Electrocleaning, Paint Spray Booth Maintenance, Neutralizing, Rust and Scale Removal, Paint Stripping, Protection Against Rust, Soak Cleaning, Washing Machine Cleaning.

L—308. Abrasive Band Wheel—Range of Sizes—The new Even-Cut Band Wheel catalog pictures the three types available which are (1) round shank units for chuck mounting, (2) wheels with threaded shanks for attachment to threaded spindles, and (3) heavy duty aluminum inset flange models drilled for arbor mounting.

Standard Band Wheels are furnished in sizes from ¼ in diameter by ½ in width to 6 in diameter x 2 in width, with matching bands in aluminum oxide, silicon carbide and garnet in open, closed and spaced grain coatings in grits from 24 to 400.

Photographs in this new catalog portray Band Wheels being used for woodworking, deburring and patternmaking. Wheels are recommended for cutting or polishing any kind of wood, metal, plastic, rubber, leather, tile, etc. Also a breakaway photograph illustrates the principle by which Even-Cut wheels give a perfectly flat cutting surface for their full width.

In addition, this new catalog gives list prices for all standard wheels and bands.

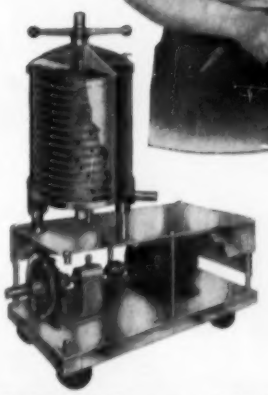
L—309. New Blower Catalog—Complete dimensions, specifications, and performance data on Hartzell's new non-overloading utility blowers with backward curved blades is presented in concise, easy-to-use form in a new bulletin, BC-11, issed by the Hartzell Propeller Fan Company, Piqua, Ohio.

Data are given for the complete line which includes 12¼ in to 36½ in belt-drive blowers, 12¼ in to 33 in direct-drive models, 12¼ in to 36½ in. Arrangement 2 blowers; 24½ in to 49 in. Arrangement 3 single width, single inlet blowers and 12¼ in to 49 in. Arrangement 3 double width, double inlet blowers.

L—310. Metalwash offers a free 12-page illustrated booklet "What You Should Know about Metal Cleaning." With an introduction on the fundamentals of metal cleaning, the booklet discusses types of cleaners, washing cycle, cleaning prior to plating, cleaning prior to painting, pickling prior to enameling, pickling between drawing operations, and the application of metal parts processing machinery to the metalworking industry.

Metalwash also offers a free 12-page illustrated booklet, "What You Should Know about Continuous Spray Pickling." With an introduction on the process of Spray Pickling (originated by Metalwash) the booklet discusses the pickling of drawn parts and the preparation of steel for porcelain enameling.

guard against Rejects



"Sealed-Disc" Filters were designed especially for plating rooms. They're smaller, compact, and more portable than ordinary conventional Filters, and they are also performing satisfactory results on many acid dips, electro cleaners andsolvents.

You can be sure with a "Sealed-Disc" Filter

More and more cost-minded platers depend on Alsop *"Sealed-Disc"* Filters to remove dirt, dust, and sludge from their plating solutions. They get better finished plated work, they save time and labor, and their plating solutions last longer. The *"Sealed-Disc"* Filter assures positive, trouble-free performance that's proof against even the invisible impurities that cause nodules and porousness, proof against rejects and reworking. There's a *"Sealed-Disc"* Filter *"to fit your job"*—write for complete information, the Alsop Engineering Corporation, 1003 Fine Street, Milldale, Connecticut.

ALSOP ENGINEERING CORPORATION

Filters, Filter Discs, Pumps, Tanks, Mixers, Agitators

Trade Literature

L—311. Sheet on Titanite—A new specifications sheet detailing the physical and chemical properties of Titanite, a high-strength aluminum alloy used for making castings with properties that compare with heat treated castings, is now available from the Aluminum Smelting & Refining Co.

Castings made from Titanite require no heat treating, are free from quench strain and warpage. They can be welded without loss of strength. Also, they have excellent strength at high temperatures, high fatigue resistance, good corrosion resistance, machine and polish well and take anodic treatment. Titanite has a tensile strength of 30,000 p.s.i. and elongation of 4–5 per cent when cast. After aging, the tensile strength is in excess of 33,000 p.s.i. and elongation remains constant.

The Brinell hardness when cast is 55; after aging, 60 to 70.

The specifications sheet contains a chemical analysis of Titanite and information regarding its workability.

L—312. 8,000 Stock Gears—An all new 200 page catalog has just been published by Universal Gear Works, Inc. Established in 1916, this firm has added to its manufacturing facilities and product line consistently.

Features of this large catalog are specifications and prices of over 8,000 stock items including gears, sprockets, chains, splines, etc. Considerable space is devoted to the 1600 Series Universal Drilling Units, dust collectors, coolant systems, grinders, and other related manufactured items.

A large number of pages describe pictorially the manufacturing facilities of Universal Gear Works which are capable of 300,000 machine hours per month. Designing and building of tools, dies, jigs, fixtures, special gears, machines, etc. are part of the services available. Gears and sprockets from ⅛ in to 8C in are produced.

In High Gear

L—313. DeVilbiss Publishes The ABC's of Spray Equipment—An adequate working knowledge of spray painting is wrapped between the covers of the DeVilbiss Company's newest publication, "The ABC's of Spray Equipment," which is available to commercial and industrial users of spray equipment.

The 64-page booklet is written in non-technical language and is illustrated with drawings to give a clearer picture of the overall spray painting subject.

The booklet has a question and answer format. The questions used in the book are the most common asked in the company's spray painting school where thousands have learned the correct spray painting techniques.

Do It Yourself

GRIND
POLISH
BUFF
DEBURR
with a
Hammond
ROTARY AUTOMATIC

SEND SAMPLES
and we'll show you how much you can speed production and cut costs.

Model "K" Hammond Automatic Finishing Machines are made in 34", 46" and 62" table sizes. These models are either continuous or for indexing at 150 to 1700 indexes per hour. Head styles include floating, non-floating with 3 H.P. to 20 H.P. range. Also available are attachments for converting heads from buffing to abrasive belt polishing. The Hammond Model "K" will speed up your grinding, polishing, buffing, brushing and de-burring operations. Send us samples and learn how much you can speed them up.

Hammond Machinery Builders INC.
1613 DOUGLAS AVENUE KALAMAZOO, MICHIGAN

"tank life DOUBLED with...

Cowles NS CLEANER!"

reports large Midwestern manufacturer

That's what happened when this major manufacturer put Cowles NS —heavy duty soak cleaner—in its cleaner tanks. Tank life was doubled, quality of cleaning was improved, and total cost was reduced greatly.

Cowles NS eliminates soap scum build-up to assure long tank life and prevent deposition of scum on cleaned parts. High emulsification properties of Cowles NS keep the tank clear and reduce the costly, time-consuming process of dumping, cleaning and recharging tanks—jobs can be run *up to twice as long* without changing.

Cowles NS provides outstanding cleaning results and its flexibility permits its successful application in both porcelain enamel plants and in plating plants.

Your Cowles Technical Representative will be very happy to discuss your soak cleaning problems with you and help bring the same exceptional results with Cowles NS that this and many other plants have experienced. Write or call today.

Cowles CHEMICAL COMPANY

7016 Euclid Avenue • Cleveland 3, Ohio

Equipment & Supplies

Please use Reader Service Card for all items in this section

E—314. Abrasive "Band Wheels" Now Available—Even-Cut rubber-cushioned abrasive-band wheels are now furnished from stock in over 50 sizes from ¼ in diameter x ½ in width to 6 in diameter x 2 in width. Matching abrasive bands are available in open, closed and spaced grain coatings in aluminum oxide, silicon carbide and garnet in grits from 24 to 400.

Even-Cut Band Wheels are extremely versatile. With only one wheel, almost any kind of cutting, polishing or finishing can be accomplished by merely using the suitable type band and grit. The Band Wheel will not change diameter and consequently it maintains a constant peripheral speed resulting in uniform operating characteristics. Even-Cut Band Wheels are suitable for use with all types of metals, hard and soft woods, leather, rubber, glass, plastics, tile, etc. They are especially recommended for general industrial use, all types of commercial woodworking, as well as high school manual training work for all types of rough and final finishing operations. The Even-Cut Abrasive Band Company is the originator of this versatile method of grinding, finishing and polishing.

Versatile

Even-Cut Band Wheels are furnished with ¾ inch or larger round shanks. Adapters are available for male or female threaded spindles. In addition, wheels are also furnished for standard grinding head mounting.

E—315. New Powder Dissolves Defective Cr, Ni—Successful results with a powder—it looks like flour, that speeds the action of acids for dissolving defective chromium and nickel from copper base metals without injuring the base metals were disclosed recently by Enthone, Inc.

The announcement was made after receipt of a patent issued to the inventor, Dr. Walter R. Meyer of Hamden, president of Enthone, Inc. The invention was hailed as a major discovery in the general metal manufacturing industry.

Dr. Meyer said that this invention, the 10th he has had patented, covers a process and product for rapid dissolving of defective chromium, nickel and other plates from copper, brass and other copper base metals without attacking the base metal.

Until now, he explained, all existing processes for dissolving nickel and chromium injured the base metal usually so badly that it required extensive labor to refinish the part. And frequently, he added, the part was destroyed beyond repair during the stripping action, all costly to industrialists.

"The new process," he said, "makes it possible to dissolve metals without hurting the base metal and leaves a clean, smooth surface, ready for refinishing."

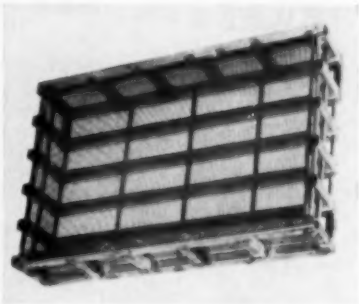
The new patent, U. S. Patent No. 2,698,781 issued January 4, 1955, is titled "Accelerating Action of Acids on Metals." The products sold under the patent are designated on the market as Enstrips "S" and 165S. Enthone, Inc., has offices and warehouses in principal cities of the United States, Europe and South America.

E—316. Conveyorized Grinding Machine—The Curtis Machine Corporation has announced the production of a small conveyorized all-purpose grinding, polishing, and deburring machine. The bench type, abrasive belt machine can handle all types of material and provides high production possibilities at low equipment cost.

Low Cost—High Production

The drive motor for the conveyor belt is an infinitely variable speed, 3 to 1 ratio, one-third hp motor, permitting complete flexibility for various types of work. The drive motor for the spring tensioned coated abrasive belt is one and one-half hp and drives at 3600 rpm. The 4-inch wide, 54-inch belt can be changed and tracked in a few seconds. A hand wheel at the front of the machine adjusts the grinding head for variations in stock thickness and regulates the grind pressure.

Multiple grinding heads for rough to finish grinding operations can be provided at a low additional cost.



Expands—Contracts

E—317. New Expansion Tray—The Wiretex Manufacturing Co., Inc., has produced an Inconel pusher tray with a channel frame, which allows it to expand and contract when heated without becoming deformed. The tray is presently being used successfully for the carbonitriding of small metal parts in an Ipsen furnace, at a temperature of 1500° F.

Overall dimensions of the tray are 21 in x 33 in x 6 in deep. It is constructed of wire mesh on a channel frame, and is provided with reinforcing corner plates. The mesh liner is replaceable.

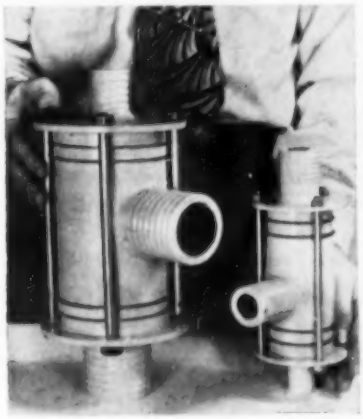
E—318. New Liquid Neoprene Coating for Chemical Process Equipment—A new "self-curing" liquid neoprene coating with outstanding resistance to corrosion has been announced by the Palladium Mastic Corporation of America for use in the chemical, plating and other process industries as well as in metal fabricating plants.

Palladium ® Liquid Neoprene is recommended for the protection of new or old equipment and structures, whether made of metal, wood or concrete, against splash, fume or spillage of nonoxidizing inorganic acids, alkalies, inorganic salts and most polar solvents.

Palladium Liquid Neoprene is also effective where chipping and abrasion due to rough handling make the use of ordinary paints impractical. The rubbery texture and high thickness per coat provide extended service life and make the coating ideal for applications where frequent repainting has previously been a costly maintenance problem. Coatings are available in black or gray and may be applied by brush as well as spray.

Equipment & Supplies

E—319. New Jet Siphons Announced—Illustrated are two sizes of Camac Acid Proof Plastic Jet Siphons for emptying waste acid from tanks and sumps. Plastic is fiberglass-reinforced Furacam which is not attacked by acid or alkaline solutions except strong chromic or nitric acid. Nozzles are sized for standard acid hose and the unit is easily dissassembled for cleaning.



Jets For The Job

Two sizes are available: size No. 3 has a capacity of 1200 gph and Size No. 6 is rated at 4000 gph with 20 lbs. steam. Operation is possible with steam from 10 psi to 50 psi. It is offered by Carl Buck and Associates.

E—320. New Immersion Heater Heats Highly Corrosive Liquids—The new "ThermX" immersion heater is now being manufactured by the N. J. Thermex Company.

Heater

This immersion heater is constructed with a chemically pure fused quartz shell which is chemically inert from practically all solvents except hydrofluoric acid and concentrated hot caustic solutions.

Excellent thermal shock resistance and heat conductivity are some of the main features of this unit.

The ThermX heater is available in lengths from 10 inches to 34 inches, from 500 to 6000 watts and 115 to 230 volts.

Heater supports are available for simplicity of mounting to various types of equipment.

For extremely severe operating conditions, sturdy chemically resistant protection tubes can be supplied.

GOOD PLATING IS VITAL!

MEAKER

PLATING MACHINES

HELP YOU GET IT

Facts....

YOU SHOULD KNOW ABOUT THE MEAKER DESIGN

Semi-automatic and full automatic plating machines justify their cost, usually in a surprisingly short time, by savings in man power, floor space, and by eliminating the cause of many undesirable conditions in the plating room. Meaker machines fulfill the most exacting requirements and have demonstrated their extremely low maintenance cost over the years.

Meaker machines are designed for maximum flexibility, lending themselves to changes in product and processing techniques. A simple and positive adjustment provides for variations in production or plating specifications.

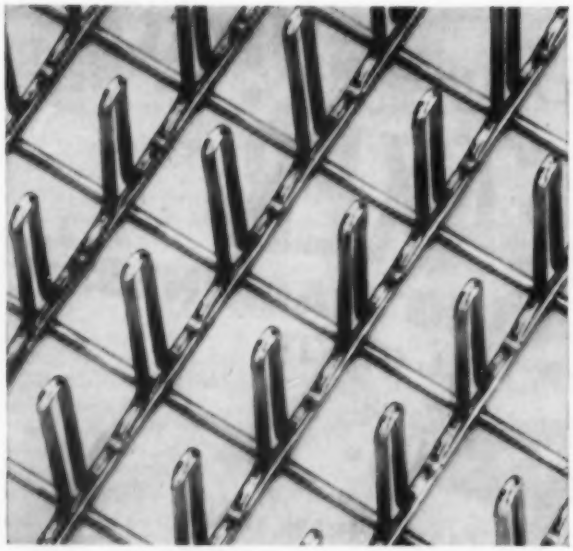
For the occasional job where a special and complicated treatment is needed requiring an intricate handling function, which even a unit as flexible as the Meaker machines cannot provide, our engineers, drawing on more than fifty years' experience in this field, will carefully analyze the problem and design equipment to satisfactorily accomplish the desired results.

Write for your free brochure of Meaker Equipment for plating, anodizing, pickling, bonderizing, and other processing. Contains numerous illustrations of plating machine installations, construction features, application information and operating tables.

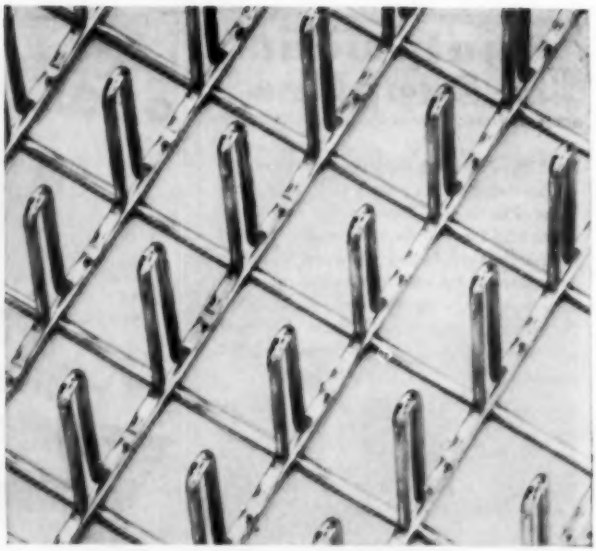
THE MEAKER COMPANY

1633 SOUTH 55th AVENUE • CHICAGO 50, ILLINOIS • Phone OLympic 2-2110

• Full Automatic and Semi-Automatic Plating Machines • Strip Steel Plating Equipment
• Wire Galvanizing Equipment • Batch Type Plating Machines • Pickling Machines
• Processing Conveyors • Motor Generators for Plating • Rectifiers for Plating



Photograph of dish drainer basket plated in ordinary chromium solution. Dark areas at base of wire fingers show no coverage of nickel.



Same product when plated in SRHS Chromium Solution. Note the even color at top and base of finger – evidence of complete coverage.

Making the most of Quality to cut your plating costs?

United Chromium points out ways to reduce expenses in the coating of metals

AT FIRST THOUGHT, "quality" seems to imply high cost. However, in a production operation like plating, quality doesn't have to cost more – it can *save*. Here are some specific cases showing how:

SAVE WITH HIGHER QUALITY CHROMIUM PLATING

It's easy to recognize a top grade chromium finish. It's bright, with no grey or rainbow plate, no burns or misses – and the deposit meets thickness specifications. The benefits of such quality plating are obvious: fewer rejects or costly reruns.

This is the kind of quality being obtained with Unichrome SRHS Chromium Plating Solutions. Having wider bright plate range than ordinary solutions, SRHS covers even difficult parts with a bright deposit. Higher speed of these solutions cuts plating time up to half for a specified thickness. Also, important constituents of the baths are self regulated to maintain optimum plating balance.

In hard plating operations, the leveling action of SRHS Chromium Solutions cuts grinding and polishing requirements, too – saving still more finishing time. In short, while turning out a quality job, SRHS also saves hours, work and headaches.

UNDERCOATS WITH QUALITY TO MATCH

Copper and Nickel plating not only contribute to the quality of the final chromium finish, but also affect the economy of the entire cycle of operation. Quality and economy are both benefited by a cycle of plating processes which are matched to each other.

Unichrome Bright Nickel, for instance, provides greater receptivity for the subsequent chromium. Passivity problems and activating treatments are avoided. Moreover, since this bath has proved exceptionally tolerant to impurities, it produces more flawless work with fewer purification treatments. Obviously, a process which can keep up a pace of untroubled production cuts operating expense.

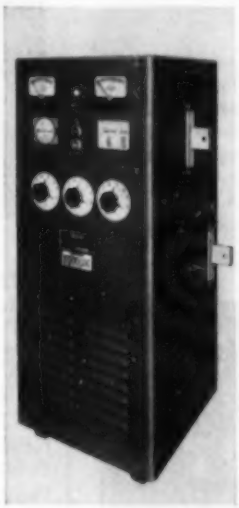
Unichrome Pyrophosphate Copper constitutes

the other member of this matched finishing cycle. It plates quality deposits of such smoothness that buffing of copper or subsequent nickel is minimized or eliminated. One plant was in this way able to cut out 98% of the need for buffing nickel, thereby saving 48 man-hours of buffing labor daily.

QUALITY EQUIPMENT COSTS LESS PER YEAR

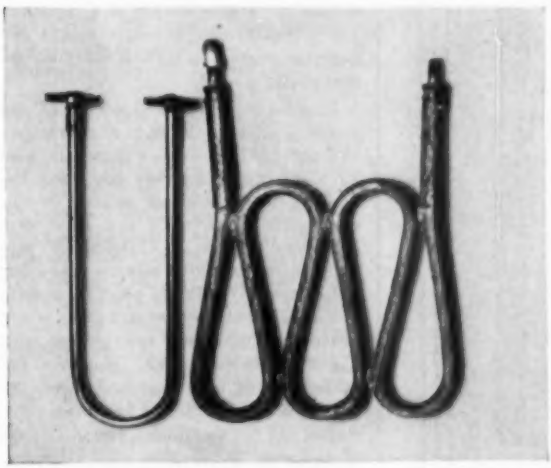
Production equipment plays a big part in production cost. The actual cost depends on how efficient the equipment is, how well it stands up, and how much time and effort it can save. In other words, it depends on quality.

Thus, Unichrome Rectifiers are built with the quality for money saving performance in plating and anodizing. They're unusual in stack design, transformer ratings, wiring, insulation details and other features – to give long, economical service at high efficiency.



Unichrome Rectifiers contain quality features that make them outstanding sources of low cost power for plating and anodizing. Shown here is a self-contained unit which includes the basic rectifier, meters, starter and controllers – all completely wired and ready for operation.

As another example, Unichrome Tantalum Coils and Heat Exchangers represent the finest equipment of their kind for use in acid plating solutions – chromium in particular. Because they are acidproof, they maintain heat transfer efficiency and can last indefinitely. At one plant, a Unichrome Tantalum Coil was inspected after four hard years of chromium plating service and found still like new. In another case, the coils' quality helped pay for the installation within months by eliminating downtime and production loss formerly experienced with lead coils.

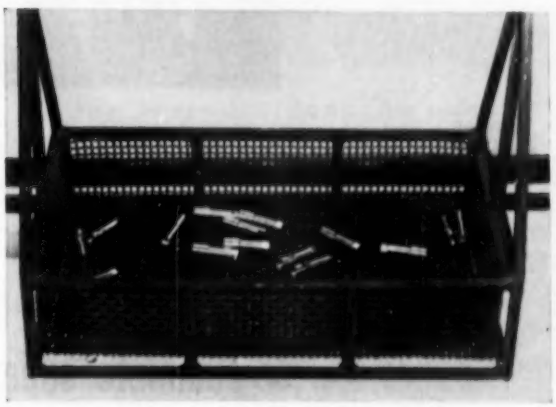


Simple, short hairpin Unichrome Tantalum Coil at left does better heating job in chromium plating bath than bulkier lead coil at right.

THE QUALITY RACK COATING

Racks represent some of the hardest working equipment in the plating shop. Coatings which have the quality to keep up with these "tools" without peeling, cracking or blistering can help reduce dragout losses, drag-in contamination, and rack maintenance expense.

Unichrome Coating 218X, a green plastisol compound and a familiar sight in many of the most cost-conscious plants, withstands all plating and cleaning cycles – even those including vapor degreasing. In some cases, the coatings have actually outlasted the racks themselves.



Quality of the familiar green Unichrome Coating 218X is so well known today that it is being used to save maintenance on equipment other than racks. Here is a dipping basket where Plastisol Coating 218X protects the work from scratches and withstands degreasing and cleaning cycles.

★ ★ ★ ★

Because quality pays off in plating, it will pay you to get the details on the complete high quality Unichrome line of processes, equipment and materials. Contact the office of United Chromium nearest you.

UNITED CHROMIUM, INCORPORATED

100 East 42nd Street, New York 17, N. Y. • Detroit 20, Mich. • Waterbury 20, Conn. • Chicago 4, Ill.

Los Angeles 13, Calif. • In Canada: United Chromium Limited, Toronto 1, Ont.

Equipment & Supplies

E—321. New Long Life Cutting Wheels—Problems faced by almost every manufacturer and machine shop are: time lost in the dressing of emery and grinding wheels; reduction in size of wheels caused by dressing; wear and "clogging" of sander belts and wheels which greatly shortens their life.

Fine Cutter

After many years of research and experimenting, Schmidgall Mfg. Co. has produced an entirely new design of cutting wheels for all nonferrous metals. Said to do away with "clogging" thus eliminating wheel dressing. It is said that these new wheels will perform many operations not possible with standard grinding and emery wheels. Actual tests indicate that they will outlast many regular wheels.

These wheels are made of high-grade steel, properly tempered. Thousands of small pits machined in the surface give the same results as grinding or emery wheels with no clogging. They cut fast with no load up.

After long usage the wheels are reversible which gives double life. When dull, reconditioning can be done at low cost. While in operation the size of the wheel remains constant—an important feature for grinding work.

These wheels are made in standard sizes and arbors, and for fine or coarse cutting.

BRASS PLATING WITH TRUE BRITE

❶ improve color

❷ save labor

❸ eliminate supervision

❶ *color stays constant . . . no rejects*

❷ *eliminates frequent analyses . . .*

❸ *trouble free . . . only one addition instead of three*

Write for FREE bulletin! Your key to better Brass Plating

Available in regular 3 to 1 ratio for yellow Brass Plating.

Special ratio materials for plating richlow brass or any other desired alloy of copper and zinc.

Suitable for both still tanks and barrels.

TRUE BRITE CHEMICAL PRODUCTS CO.

P. O. Box 31, Oakville, Conn.

Surface Coater

E—322. Plastic-Base Ceilcrete "B" Protects Concrete From Fluorides and Hydrofluoric Acid—The Ceilcote Company announced today the availability of an improved Ceilcrete "B" surface treating material which has been extensively tested and is now recommended for low-cost protection of concrete from fluorides, hydrofluoric acid and hydrofluroic acid solutions.

A thermosetting plastic base surfacing, Ceilcrete "B" can be applied to floors, trenches, tank bases and other concrete structures. A minimum coating of ⅛-inch provides a monolithic membrane that is impervious to solutions containing hydrofluoric acid. The extreme density and steellike hardeness of Ceilcrete "B" makes it ideal for a wide variety of applications where resistance to abrasion, impact and constant immersion in acid solutions are important.

In many applications, Ceilcrete "B" has actually replaced brick. For example: Ceilcrete "B" has been successfully used for lining of pickling tank pits where hydrofluoric acid is being used. In this application walls, sides and floor were coated with ⅛-inch of Ceilcrete "B" providing a monolithic membrane protecting the concrete. Ordinary practice in such instances has been to protect floors where service conditions are most severe with 2¼ or 2½ inches of brick. Walls that are subjected only to spillage and splash are protected with 4 inches of brick to achieve stability of the sheathing. The utilization of Ceilcrete "B" in this application has substantially reduced the cost and proven completely satisfactory as a replacement for brick.

The manufacturer further states that Ceilcrete "B" is not confined exclusively to applications where hydrofluoric acids are used. Rather it can be used in a wide variety of installations because only a few chemicals have any marked corrosive effect on this improved material.

Equipment & Supplies

E—323. Permanent Cartridge Type Water Demineralizer—Get demineralized water from your water tap at an amazingly low cost. Just developed by Enley Products, Inc., the Perma-Demon is the only water demineralizer of its size which does not require cartridge replacement by the manufacturer. Therefore, it performs with the same economy as any larger size permanent cartridge type demineralizer, and the initial cost is extremely low.

For Softer Water

Designed by Enley Products, Inc., specially for use by laboratories, electroplaters, mirror manufacturers, etc., as high resistance water . . . wherever distilled water is needed for industrial purposes.

As raw water flows from the tap into the Perma-Demon, all ionizable impurities are removed and the result is high purity water. The ion-exchange material can be easily removed and the Perma-Demon refilled with fresh material.

E—324. Rugged Pen-Size Microscope—Fifty-power magnification is provided in the new measuring microscope, now marketed by the International Development Company, enabling fast on-the-spot measurements to 0.001 inch.

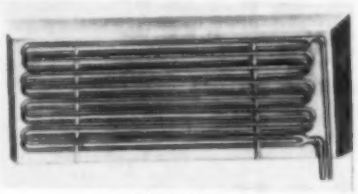
Midget Microscope

Shorter than the ordinary fountain pen, this rugged, lightweight Indeco microscope is simple to operate. Focusing is accomplished by placing the microscope near the object to be measured and tilting slightly to obtain the clearest image. A small concave reflector directs and intensifies light on the field.

One-tenth of an inch—maximum measurement on reticle—is divided into 100 scale markings of 0.001 inch. Five ten-thousandths (0.0005) of an inch can be estimated easily with reasonable accuracy.

E—325. Fast Starts on All Liquid Heating Jobs—Rempe Company has announced a new standard line of heaters called Hi-Therm Grid Heaters for maximum, high speed, efficient heating of solutions in plating tanks, rinse tanks, cleaning tanks, caustic tanks and for all general fluid heating service.

These heaters feature a maximum amount of prime heat transfer surface in a limited space. The cross sectional width is only 2¾ inches.



Heats Fast

High concentration of heating surface makes the Hi-Therm Grid far superior to plate coils in that they promote agitation within the solution being heated. The staggered arrangement of the tubes accelerates fluid motion by its high conduction and convection factor—a most important requirement in solution heating.

In practically all cases where solutions are to be heated to boiling, the installation of one Hi-Therm on the back wall of the tank is all that is necessary. It can, however, be used on side or bottom of tank with horizontal or vertical supply and return.

Standard height is 31½ inches; length to requirement. Fabricated from full weight bending quality wrought steel pipe and tested 350 lbs pressure.

Average heat transfer coefficient for the standard Grid when heating solutions of water to boiling point is 800 BTU per degree TD, per hour, per lineal foot of length OA.

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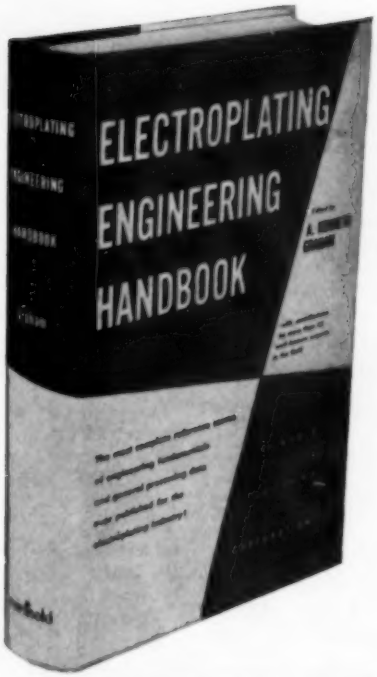

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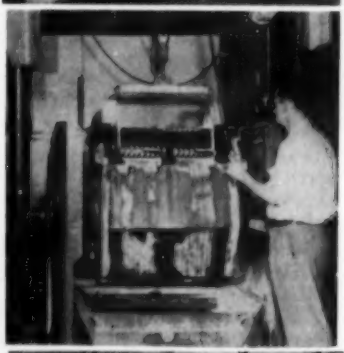

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ANALYTICAL DETERMINATION OF TRACE CONSTITUENTS IN METAL FINISHING EFFLUENTS

VIII. THE COLORIMETRIC DETERMINATION OF MANGANESE IN EFFLUENTS

EARL J. SERFASS† AND RALPH F. MURACA†

The following paper, the eighth of a series, is a result of the work sponsored at Lehigh University by the AES and the Ohio River Valley Water Sanitation Commission. While the original procedure was worked out under AES sponsorship, the modificarion was developed under ORSANCO sponsorship, the commission having placed the project at Lehigh so as to be able to utilize the background developed by AES Project No. 2. It should be noted that the methods described in this series were tested, modified if necessary, and retested by at least six and sometimes as many as twelve industrial laboratories. As a result of this, the approved form, as published here, was developed.

Abstract

A colorimetric procedure is presented for the determination of 5 to 50 ppm of ammonia in effluents. The method was found to yield satisfactory results in the presence of 100 ppm of each of 23 cations in simultaneous admixture.

In this method, the ammonia content of the effluent is distilled off in the usual Kjeldahl equipment and the ammonia in the distillate is determined by Nessler's reagent.

A simplification of this method is possible when the concentration of each substance in the sample, other than ammonia, is below 10 ppm.

The Colorimetric Determination of Ammonia in Effluents

Since the determination of ammonia in small quantities is almost generally carried out by means of Nessler's reagent, no literature survey was undertaken to determine the various methods available for the analysis of ammonia. The only point of question was whether ammonia could be evolved from an alkaline solution in the presence of large amounts of salts. Serfass, Levine, and Davis[1] have shown that the presence of a large amount of nickel salts does not interfere with the liberation of ammonia from an alkaline solution. On the other hand, the work of Serfass, Muraca and Gardner[2] has already indicated that ammonia can be evolved quantitatively from boiling alkaline solutions containing large amounts of a large number of elements. Therefore, the usual Nesslerization procedure can be used.

Description of the Method

The sample of the effluent is placed in a Kjeldahl flask, made alkaline with sodium hydroxide, treated with sodium sulfide, and boiled. The distillate is collected in dilute acid and the ammonia present in the distillate is determined by Nessler's reagent either with a colorimeter (turbidimeter)or by comparison in Nessler tubes. The sodium sulfide is added during the boiling with alkali in order to insure the rapid and complete release of ammonia from metallic-ammonia complexes such as the cobalt ammines. When mercury[1] is present in the effluent, it will react with ammonia:

$$Hg_2^{+2} + NH_3 + OH^- \rightarrow Hg + HgNH_2 + H_2O$$

The addition of a sulfide will release the ammonia:

$$HgNH_2^+ + S^{-2} + H_2O \rightarrow HgS + OH^- + NH_4$$

(2) *Hydrochloric Acid Solution:* Approximately N/10.

(3) *Gum Arabic Solution:* 2 per cent w/v.

(4) *Nessler's Solution:* Dissolve 50 g of potassium iodide in approximately 35 ml of cold, ammonia-free water. Since the recommended procedure does not involve a step for the removal of organic matter which may liberate ammonia in alkaline medium, the determination will be in error when such substances are present in the sample.

The procedure yielded excellent results in the presence of 100 ppm of each of 23 common cations, together with nitrates, sulfates, tartrates, cyanides, and thiocyanates.

Sensitivity of the Method

The sensitivity of the method is defined as the number of micrograms of ammonium ion which can be determined with a relative error of ± 50 per cent. For the following procedure, this corresponds to 2 ppm or 200 micrograms of ammonium ion in the 100 ml sample taken for analysis.

Limit of Detection of the Method

The limit of detection of the method is defined as the number of micrograms of ammonium ion which must be present in the 100 ml sample taken for analysis so that an extinction of 0.005 will be obtained in Step 8 for a 1 cm cell thickness at 400 millimicrons. For the recommended procedure, the limit of detection is 50 micrograms of ammonium ion (0.5 ppm).

Discussion of the Blank

A blank is used to compensate for the presence of traces of ammonia in the reagents.

Discussion of the Sample

If the sample is alkaline, it must be analyzed immediately or loss of ammonia by vaporization will occur. If the sample is acid or neutral, the hydrolysis of any cyanates present is in progress and consequently the sample must be analyzed immediately. The acidified sample may be stored for long periods of time if cyanates are absent.

Recommended Procedures

This procedure is designed to be used for the determination of 5 to 50 ppm of ammonium ion in a 100 ml sample of effluent.

Reagents Required

(1) *Sodium Hydroxide-Sodium Sulfide Solution:* Saturate 250 ml of 25 per cent w/v NaOH solution with H_2S gas. Mix this solution with 750 ml of 25 per cent w/v NaOH solution.

Add slowly a saturated solution of mercuric chloride until the first slight precipitate of red mercuric iodide persists, and then add 400 ml of a clarified 9 *N* solution of sodium hydroxide. Dilute the solution to one liter with ammonia-free water and allow it to settle. Siphon off the clear supernatant liquid for use.

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(5) *Standard Ammonia Solution:* Dissolve 0.732 g of pure, dry ammonium sulfate in water and dilute to one liter.

1 ml = 200 micrograms of NH_4^+

For establishing a calibration curve, 1 ml of this solution used in Step 3 corresponds to 5 ppm of ammonia in a 100 ml sample of effluent taken for analysis in Step 1 of the recommended procedure.

Special Equipment

(1) Kjeldahl distillation equipment with 300 ml flasks.

Procedure

(1) Pipette a 100 ml sample of the oil-free effluent into the Kjeldahl flask.
In running a blank or establishing a calibration curve, use 100 ml of water. Each ml of the standard ammonia solution corresponds to 2 ppm of ammonium ion in the sample.

(2) Set a 125 ml Erlenmeyer flask containing 20 ml of 0.1 N HCl so as to receive the distillate. Be sure that the end of the condenser dips well under the acid in the flask.

(3) Add 40 ml of the sodium hydroxide-sodium sulfide solution to the Kjeldahl flask and immediately connect the flask to the distilling apparatus. Then shake the flask so as to mix the contents very well.
Collect between 50 and 60 ml of distillate in the acid solution.

(4) Transfer the distillate to a 100 ml volumetric flask and dilute to the mark.

(5) Pipette 10 ml of this solution into a 100 ml volumetric flask.

(6) Add 3 drops of a 2 per cent gum arabic solution; swirl the contents of the flask.
Add 1 ml of Nessler's reagent and mix well.
Dilute up to the mark with water, shake well and wait 5 minutes.

(7) Set the colorimeter to zero with water using a blue (No. 42) filter. With a spectrophotometer set the instrument to read full scale with water at about 400 millimicrons.
The intensity of the developed color (turbidity) can be estimated by comparing the sample against Nessler standards.

(8) Transfer the solution from Step 6 to the sample cuvette and read the colorimeter.

(9) If necessary, convert the scale readings of the photometer to optical density. Subtract the blank reading from the sample readings. If a calibration curve is being established, plot these corrected readings versus ppm of ammonium ion. If a sample is being run, read the amount of ammonium ion from the calibration curve.

Variation of the Recommended Procedure

If the composition of the effluent is known, the recommended procedure for ammonium ion can be materially shortened.

The following table summarizes the changes which can be made in the recommended procedure for ammonium ion when the composition of the sample is known. Unless otherwise stated, the concentration of other elements must not exceed 100 ppm. For effluents containing greater quantities of these elements, dilution will be necessary. The effluent should be between *p*H 2 and 9. The use of Rochelle Salts to prevent precipitation of hydroxides was proposed by Dodge and Zabban.[3]

TABLE I

Composition of Effluent	Changes in the Recommended Procedure for the Determination of Cyanates
Alkali metals, alkaline earths, zinc, and aluminum below 100 ppm each; all other elements below 10 ppm each. Cyanides, thiocyanates, and sulfides below 1 ppm.	Pipette a 10 ml sample of effluent into a 100 ml volumetric flask and add about 50 ml of water. Add 1 g of Rochelle Salts. Shake, and start with Step 6 of the recommended procedure.

Procedure 0.01 to 5 ppm of Ammonia

The following procedures indicate the steps to be taken in the analysis for ammonia 0.01 to 5 ppm when the effluent contains less than 5 ppm each of other elements.

The effluent should have a *p*H of 2 to 9 and should contain less than 0.05 ppm each of cyanides, thiocyanates, and sulfides for 0.1 to 5 ppm of ammonia.

Range of Ammonia	Procedure
0.01 to 0.1 ppm	Use the recommended procedure. In step 1 use a 50 ml sample. Omit step 4. Neutralize the distillate obtained from step 3 using NaOH solution and litmus paper. Using the entire distillate, proceed with step 6. Make the comparison nephelometrically using prepared Nessler standards in 100 ml tubes.
0.1 to 1 ppm	Pipette a 50 ml sample of the effluent into a 100 ml volumetric flask and add about 0.2 g of Rochelle Salts. Shake, and start with step 6. In step 8, use a 5 cm cuvette.
1 to 5 ppm	Pipette a 25 ml sample of the effluent into a 100 ml volumetric flask and add about 0.2 g of Rochelle Salts. Shake, and start with step 6. In step 8, use a 2 or 5 cm cuvette.

REFERENCES

[1] E. J. Serfass, W. S. Levine and R. M. Davis, Plating **36**, 158 (1949).

[2] E. J. Serfass, R. F. Muraca and D. G. Gardner. See this report, "The Colorimetric Determination of Cyanates in Effluents."

[3] B. F. Dodge and W. Zabban, Plating **39**, 381 (1952).

Dr. Earl J. Serfass, Head of the Chemistry Department at Lehigh University, is serving his second consecutive term as chairman of the AES Research Committee.

Dr. Ralph F. Muraca, is an assistant professor in the department of chemistry at Lehigh University. This report incorporates results of AES project 2 at Lehigh University with which he was associated.

SIMULTANEOUS POLAROGRAPHIC DETERMINATION OF CADMIUM AND ZINC IN ALKALINE CYANIDE SOLUTIONS

By T. A. Downey*

Synopsis

This paper describes a simple, specific, polarographic procedure for the determination of cadmium and zinc in alkaline cyanide solutions. Since the same method is used for the determination of both cadmium or zinc, it is possible to check a cadmium bath for zinc contamination and a zinc bath for cadmium contamination.

The results obtained by this method are not influenced by the common impurities found in alkaline cyanide cadmium and zinc plating baths. This is not the case for the conventional potassium ferrocyanide method. This method, since it does not involve initial precipitation of the cadmium or zinc, takes less time per determination.

Introduction

In routine control analysis for the metal content of cadmium and zinc plating solutions, it is essential to have a method which is rapid and specific. The standard volumetric potassium ferrocyanide method as used in most plating laboratories has several shortcomings:

1. It is customary to use an external indicator for the titration making the titration slow and cumbersome.
2. The solution must be maintained at about 70° C during the titration.
3. In the customary zinc determination, cadmium, iron and copper interfere with the analysis, causing high results.
4. In the conventional cadmium determination, zinc interferes with the assay.

In order to develop a method which would be rapid and specific, the polarographic determination of cadmium and zinc in alkaline cyanide solutions was explored. After some experimentation it was found possible to determine both cadmium and zinc by the same polarographic procedure. This fact makes it possible to determine cadmium as the main constituent of a solution and also check for zinc as a contaminant; the reverse can also be accomplished.

In an attempt to analyze zinc polarographically, the method of Diaz and Lindemann[1] was tried without much success. The principal disadvantages of their method were:

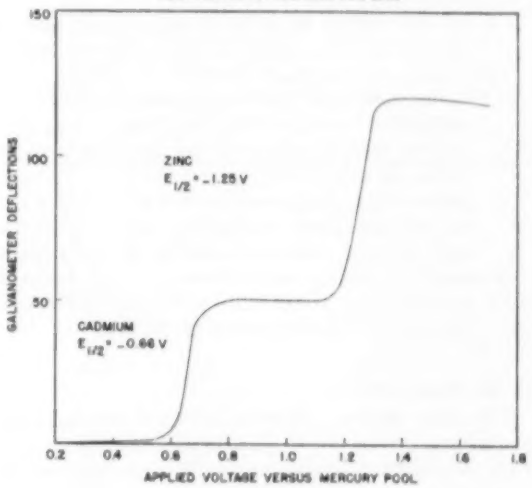
1. Unless the hydrochloric acid used to decompose the sample is completely driven off, the final dilution in the potassium chloride electrolyte is too acid for an accurate measurement[2] of the zinc polarogram.
2. The method requires a double dilution and also the plotting of a full polarogram. These conditions tend to make the method too time consuming for routine use.

Experimental

Kolthoff and Lingane[3] state that zinc and cadmium give excellent polarograms in an ammoniacal supporting electrolyte. Since cadmium, which is quite frequently found in zinc solutions, also gives an excellent polarogram in this medium, it was thoroughly investigated. The supporting electrolyte finally chosen was 0.36 N in ammonium chloride, 0.62 N in ammonia and 0.01 per cent in gelatin. Fig. 1 shows a polarogram of cadmium and zinc in this supporting electrolyte.

FIG. 1

POLAROGRAM OF CADMIUM AND ZINC



Outline of the Determination

This procedure is the same for both cadmium and zinc solutions.

A. Reagents and special equipment
   1. Hydrochloric acid, 30 per cent by volume.
   2. Concentrated ammonium hydroxide.
   3. Freshly prepared 1 per cent USP gelatin solution.
   4. Several 10-ml capacity Heyrovsky vessels.
   5. Standard polarograph with dropping mercury electrode assembly.
   6. Several pounds of ACS grade mercury.

B. Sample procedure
   1. For a zinc cyanide solution, carefully pipette 1.00 ml

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of sample (Caution! Use a rubber bulb for pipetting) into a 100 ml pyrex volumetric flask. For cadmium cyanide take a 2.00 ml sample.

2. Carefully add 1 ml of concentrated hydrochloric acid to the flask. (This operation must be performed in a well ventilated hood as poisonous hydrogen cyanide is evolved.)
3. Place the flask on a hotplate and carefully heat until all the cyanides and carbonates are decomposed. (It is advisable to heat on a thin asbestos board to avoid bumping.) The solution should be heated until most of the residual hydrochloric acid is expelled and salts are formed.
4. Cool the flask and add 10 ml of the hydrochloric acid reagent.
5. Add 7 ml of concentrated ammonium hydroxide and 50 ml of water.
6. Add 1 ml of gelatin reagent. This reagent should be prepared fresh every other day. It is advisable to fill about 10 small stoppered vials with 0.50 g portions (50 ml of one per cent gelatin) thus avoiding repeated trips to the balance.
7. Dilute to volume with distilled water and then shake the flask thoroughly.
8. Transfer a portion of the solution to a Heyrovsky cell and deaerate for five minutes with water-scrubbed nitrogen. (If 0.100 g of sodium sulfite is added, the solution shaken thoroughly and allowed to stand for five minutes, the bubbling with nitrogen can be omitted.)
9. Fill the bottom of a Heyrovsky cell with sufficient mercury to make contact with the platinum lead.
10. Using a convenient galvanometer sensitivity (0.3-0.6 microamperes per millimeter) record the diffusion currents at −0.5, −0.85, −1.0 and −1.45 volts. (All the applied voltages in this paper are measured versus the quiet mercury pool.)
11. Subtract the −0.5 v reading from the −0.85 v reading and the −1.0 v reading from the −1.45 v reading. The first value multiplied by the galvanometer sensitivity setting is the diffusion current due to the cadmium. the second value multiplied by the sensitivity is the diffusion current due to zinc.

C. Standard procedure

A standard must be run with each series of sample solutions to avoid errors due to variations in room temperature. If the standard and samples are run in a constant temperature bath, it is not necessary to run daily standards.

1. Dissolve 9.00 g of ACS grade granular cadmium in 40 ml of 1:1 hydrochloric acid. (It may be necessary to boil the solution and add a few drops of concentrated nitric acid to completely dissolve the cadmium.) The cadmium should be dissolved in a 1000 ml pyrex volumetric flask and then diluted to the mark with distilled water. This solution is the stock cadmium standard and when used as outlined in this procedure, it is equivalent to a cadmium solution which is 3.00 oz/gal in metallic cadmium.
2. Dissolve 6.00 g of ACS grade granular zinc in 40 ml of 1:1 hydrochloric acid. Dilute the solution to one liter with distilled water. This solution is the stock standard zinc solution and when used as outlined in this procedure, it is equivalent to a zinc cyanide solution which is 4.00 oz/gal in metallic zinc.
3. Depending on which determination is being made, pipette 5.00 ml of the respective standard solution into a 100 ml glass stoppered volumetric flask.
4. Then continue as outlined in steps 4–9 of the sample procedure.
5. If the standard is a cadmium standard, record the diffusion current at −0.5 v and −0.85 v; if the standard is a zinc standard record the diffusion current at −1.0 v and −1.45 v.
6. Calculate the cadmium or zinc diffusion current as outlined in step 11 of the sample procedure.

D. Calculations

$$\frac{\text{Diffusion current for the cadmium sample}}{\text{Diffusion current for the cadmium standard}} \times 3.00 = \text{oz/gal of metallic cadmium in the sample}$$

$$\frac{\text{Diffusion current for the zinc sample}}{\text{Diffusion current for the zinc standard}} \times 4.00 = \text{oz/gal of metallic zinc in the sample}$$

Discussion of the Method

Evaluation of Method

In order to test this method two stock standard solutions were prepared. The stock cadmium cyanide plating solution when analyzed contained:

Cadmium	4.26 oz/gal
Sodium cyanide	25.5 oz/gal
Sodium hydroxide	2.4 oz/gal

The cadmium content of this solution was determined by the electrodeposition method outlined by Hillebrand.[4]

The stock zinc cyanide solution when analyzed contained:

Zinc	4.56 oz/gal
Sodium cyanide	12.0 oz/gal
Sodium hydroxide	12.0 oz/gal

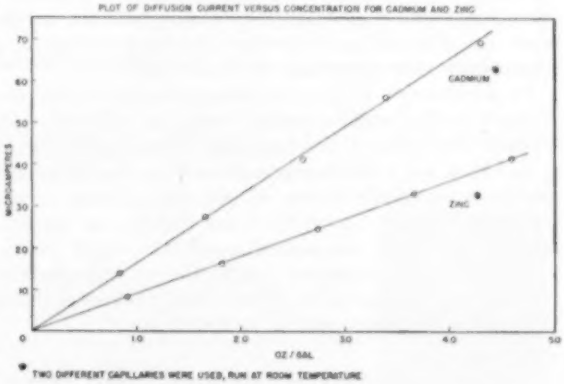
The zinc content of the above solution was determined by the standard volumetric potassium ferrocyanide method using uranyl acetate as the indicator.

Cadmium and Zinc as Main Constituents

In order to test the polarographic assays for cadmium and zinc and also to test the constancy of the diffusion current to concentration ratio, the standard cadmium and zinc cyanide solutions were diluted exactly 80, 60, 40 and 20 per cent. These sets of four dilutions plus the stock standard were then analyzed in duplicate by the polarographic method.

Fig. 2 shows the excellent results which were obtained

FIG. 2
PLOT OF DIFFUSION CURRENT VERSUS CONCENTRATION FOR CADMIUM AND ZINC



● TWO DIFFERENT CAPILLARIES WERE USED, RUN AT ROOM TEMPERATURE

for the diffusion current to concentration ratio for both cadmium and zinc. The concentration range investigated easily covers the usual concentrations found in cyanide cadmium or zinc solutions. The excellent ratio relationship also shows that the two point method used in determining the diffusion currents for cadmium and zinc is an acceptable one for this routine assay.

Table I contains polarographic results for the series of cadmium cyanide solutions. These results are compared with the results obtained by the electrodeposition method. The average difference between the two methods is +0.9 per cent, a value well within the acceptable range of accuracy for plating analyses. Table II contains the polarographic results for the series of zinc cyanide solutions. These results when compared with the values obtained by the potassium ferrocyanide method, show a difference of +0.6 per cent which is acceptable for plating analyses.

Cadmium and Zinc as Contaminants

In order to check the ability of this assay method to determine cadmium as a contaminant in zinc solutions and zinc as a contaminant in cadmium solutions, the following work was performed:

The stock cadmium solution previously described was diluted accurately by 60 per cent and contaminated with known amounts of zinc. Table III contains the results of this work showing the amounts of cadmium and zinc found in these solutions. The table also lists the results obtained on these solutions when assayed by the conventional potassium ferrocyanide method. It is notable that considerable error is made when the zinc is present in concentrations of 0.25 oz/gal or more. This amount of contaminant may seem high but our laboratory has found several supposedly "cadmium cyanide" solutions which contain 0.5 to 1.0 oz/gal of zinc in addition to the cadmium. Since zinc has a much smaller atomic weight than cadmium, it will consequently cause greater errors per gram than cadmium when the assay is performed by the conventional potassium ferrocyanide method.

The stock zinc solution was accurately diluted 60 per cent and contaminated with known quantities of cadmium. Table IV contains the results of this work showing the amounts of zinc and cadmium found. The table also contains the

TABLE I. CADMIUM

Comparison of Polarographic and Electrodeposition Methods

Cadmium oz/gal		Per cent difference
Electrodeposition	Polarographic	
4.26	4.30 4.30 av 4.30	+1.0
*3.41	3.43 3.38 av – 3.40	+0.3
*2.56	2.63 2.56 av – 2.60	+1.6
*1.70	1.74 1.72 av – 1.73	+1.8
*0.85	0.86 0.84 av – 0.85	+0.0 av = +0.9

*These concentrations are based on 80, 60, 40 and 20 per cent dilutions of the original stock which was analyzed by the electrodeposition method.

TABLE II. ZINC

Comparison of the Polarographic and Potassium Ferrocyanide Methods

Zinx oz/gal		Per cent difference
Potassium Ferrocyanide	Polarographic	
4.57	4.57 4.61 av 4.59	+0.4
*3.66	3.65 3.68 av 3.66	+0.0
*2.74	2.76 2.72 av 2.74	+0.0
*1.83	1.84 1.87 av 1.86	+1.6
*0.91	0.93 0.90 av 0.92	+1.1 av = +0.6

*These concentrations are based on 80, 60, 40 and 20 per cent dilutions of the original stock which was analyzed using the potassium ferrocyanide method.

TABLE III. ZINC CONTAMINATION IN CADMIUM CYANIDE SOLUTIONS

		Polarographic Method		
Cadmium* oz/gal	Zinc Added oz/gal	Cadmium Found oz/gal	Zinc Found oz/gal	Cadmium Found by Pot. Ferro-Cyanide oz/gal
2.56	0.125	2.59	0.104	2.76
2.56	0.250	2.59	0.248	2.84
2.56	0.500	2.59	0.493	3.27
2.56	1.00	2.59	1.08	3.87

*Concentration based on 60 per cent of original stock which was analyzed by the electrodeposition method.

TABLE IV. CADMIUM CONTAMINATION IN ZINC CYANIDE SOLUTIONS

		Polarographic Method		
Zinc*	Cadmium Added	Zinc Found	Cadmium Found	Zinc Found by Pot. Ferro-Cyanide Method
oz/gal	oz/gal	oz/gal	oz/gal	oz/gal
2.74	0.086	2.79	0.092	2.86
2.74	0.173	2.82	0.187	2.84
2.74	0.432	2.61	0.436	3.06

*Concentration based on 60 per cent of original stock solution analyzed using the potassium ferrocyanide method.

results obtained by the potassium ferrocyanide method. It is shown that cadmium does not cause as much error in the zinc assay as does the zinc in the cadmium assay. This is to be expected on the basis of their atomic weights.

Effect of Metallic Impurities

Some of the common metallic impurities which might possibly be present in the cadmium or zinc cyanide solutions are copper, iron, nickel, tin or lead. Since this method would not remove these impurities if they were present, their influence on the zinc and cadmium determination was studied.

In this ammoniacal supporting electrolyte, copper (cupric) gives two reduction waves, their half wave potentials are $E_{1/2}$ 0.00 v and $E_{1/2}$ −0.35 v versus the mercury pool. Since the $E_{1/2}$ for cadmium in this electrolyte versus the pool is −0.69 v and for zinc is −1.25 v and the first diffusion current reading for cadmium is taken at −0.5 v, copper doesn't interfere with the determination of either cadmium or zinc.

If iron is present in the sample it will be present as the ferrocyanide which will be decomposed during the treatment with hydrochloric acid. This will leave the iron as the ferrous chloride and some ferric chloride; the ferrous and ferric ions, however, will be precipitated from the solution upon the addition of the ammonium hydroxide and therefore will not interfere with the determinations. These insoluble hydroxides need not be removed from the solution.

Nickel, when present in this supporting electrolyte, has an $E_{1/2}$ of −0.97 v versus the pool and since the cadmium voltage settings are −0.5 v and −0.85 v it will not interfere with this determination. The presence of appreciable amounts of nickel in a zinc cyanide solution (greater than 0.5 oz/gal) would cause an error of 5 to 10 per cent since the voltage settings for zinc are −1.0 and −1.45 v. However, since it is extremely unlikely to have nickel present in a zinc cyanide solution and if it were present the amounts would probably be much less than 0.1 oz/gal, its interference is negligible.

Tin might find its way into a cadmium or zinc bath if tin anodes or anode balls are used accidentally. It then would be present as the stannate. Stannate tin was tested and found to give no polarographic reduction wave with this procedure.

Lead has an $E_{1/2}$ of −0.43 v versus the pool in this supporting electrolyte, so it would interfere with the cadmium reading at −0.5 v. However, since lead is much less sensitive polarographically per unit weight than cadmium, because of its higher molecular weight, its interference will be negligible.

Effects of Brighteners

Since a great majority of the cadmium and zinc solutions analyzed by our laboratories contain organic or inorganic addition agents the effect of these constituents upon the assay were determined. Several addition agents were tested and found not to interfere with the assays. However, if the samples to be analyzed are known to contain an addition agent, it is advisable to check the influence of the addition agent upon the determination.

Summary

A simple, rapid and specific polarographic assay for zinc and cadmium is outlined in this paper. This assay essentially consists of decomposing the cyanides, carbonates and hydroxides in the sample solution with hydrochloric acid and then adding an excess of ammonia to give an ammoniacal ammonium chloride solution. Gelatin is then added to the system. It is deaerated and the polarogram heights are measured by the two point method. The common metallic impurities found in these baths do not interfere with this assay. Besides being simple and specific this assay will take less time than the standard zinc and cadmium analysis methods. This assay has been used in author's laboratory for over 6 months with excellent results.

Literature Cited

[1]R. Diaz and E. H. Lindeman, Plating 40, 762 (1953).

[2]M. Kolthoff and J. J. Lingane, "Polarography" 2nd edition, 503, Interscience Publishers, New York (1952).

[3]Ibid, 504.

[4]E. F. Lundell, H. A. Bright and J. I. Hoffman, "Applied Inorganic Analysis," 2nd edition, 257, John Wiley and Sons Inc., Publishers, New York (1953).

T. A. Downey

T. A. Downey was born in Brooklyn in 1926. Received a B.A. in Chemistry from N.Y.U., thereafter worked for Charles Pfizer and Co., Brooklyn. M.S. in Analytical Chemistry from Polytechnic Institute of Brooklyn in 1953. Has extensive experience in analytical instrumentation. Joined Hanson-Van Winkle-Munning Co. in April 1953, as head of the analytical laboratories. Aim there was to develop new instrumental analytical methods and revise and improve standard procedures. Succeeded in applying polarographic and spectrophotometric procedures to numerous plating salts and solutions. Now hopes to analyze all the metallic components of baths by rapid specific instrumental methods. Is married and has one son. Is a ACS and AES member.

ELECTROLYTIC COATINGS ON MAGNESIUM BASE ALLOYS FROM ALKALINE CHROMATE SOLUTIONS

By

F. Ogburn*, H. I. Salmon†, M. L. Kronenberg

Introduction

The relatively rapid rate of corrosion of magnesium alloys has been a serious limitation to their use in certain environments. As a consequence, considerable effort has been devoted to developing protective coatings for these alloys. Two direct outgrowths of these efforts are a proprietary acid chromate process and the HAE process[1] of Frankford Arsenal, each of which is an electrolytic or anodizing process. Both of these processes produce hard coatings which offer good protection against wear and corrosion.

Another electrolytic process which employs a simple alkaline chromate solution is covered by a patent[2] issued in 1943. This process has been further investigated by this laboratory with interesting results. Laboratory tests indicate that by proper adjustment of the variables of the process, coatings can be produced which are equivalent to the acid chromate and HAE coatings, with respect to protection against salt spray corrosion.

Process Description

The basic process employs an aqueous bath containing sodium or potassium hydroxide and the corresponding chromate. An alternating current is passed through the bath with the magnesium alloy specimens acting as the electrodes. The characteristics of the coatings thus formed depend on composition of the bath and on the operating conditions. The bath and operating conditions set forth in Table I have given very good results, especially with FS alloys.

TABLE I. DETAILS OF THREE PROCESSES FOR APPLYING ELECTROLYTIC COATINGS TO MAGNESIUM ALLOYS

Process	Electrolyte	Grams/ liter	Ounces/ gallon	Current density* amp/ft²	Time min	Temp ° F	Voltage	Film Thickness mils
Alkaline chromate	Sodium hydroxide	10 to 25	1.3 to 3.3	80 to 140	20 to 40	150 to 170	10 to 12 a-c (5 to 6 if one electrode is inert)	1 to 2
	Sodium chromate	80 to 240	10.7 to 32					
	Water	to make one liter	to make one gallon					
	or							
	Potassium hydroxide	15 to 35	2 to 4.7					
	Potassium chromate	95 to 290	12.7 to 38.7					
	Water	to make one liter	to make one gallon					
Acid Chromate	Ammonium acid fluoride	240	32	10 to 100	1 to 30	160 to 180	Up to 110 a-c or d-c	—
	Sodium dichromate	100	13.3					
	Phosphoric acid 85 per cent	90 cc	11.5 fl oz					
	Water	to make one liter	to make one gallon					
HAE	Potassium hydroxide	120	16	Variable 30 preferred	60 to 90 at 30 amp/ft²	75 to 105	Up to 100 a-c	—
	Aluminum hydroxide	30	4					
	Trisodium phosphate	35	4.7					
	Potassium fluoride	35	4.7					
	Potassium manganate	22	2.9					
	Water	to make one liter	to make one gallon					

*Total current divided by surface area of single electrode.

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Some of the details of the acid chromate and the HAE processes are also summarized in Table I for comparison. The most important differences between this alkaline chromate process and the other two are that (1) the process operates at a much lower voltage, and (2) the bath contains only two constituents other than water.

Properties of Coating

A smooth gray-green coating is produced which is hard as indicated by scratch and Taber abraser tests. The color of the coating is not so uniform as that of either the HAE or the acid chromate coating. The surface exhibits some sheen, especially if the initial surface is very smooth. Gas adsorption measurements (Brunauer-Emmett-Teller method) indicate that the coating has a smaller effective surface area than HAE coatings. Coatings of 0.5 mil or less in thickness on alloy panels can be bent or flexed without apparent cracking. Thicker ones crack on the tension side and chip or shatter on the compression side of the bend. The coating is dissolved by dilute acids such as hydrochloric acid (1:2). This solution will remove a coating approximately 1.5 mils thick in about one minute.

Coating Distribution

The coating distribution is not so good as that of processes requiring high voltages, such as the HAE process. For example, if two flat magnesium alloy panels are suspended in a bath parallel to each other and about 2 or 3 inches apart, with each panel serving as one electrode, the coatings obtained in about 30 minutes will have a thickness of about 0.8 mil on the outside surfaces and about 1.9 mils on the inside or facing surfaces. More uniform coatings are obtained by following ordinary electroplating racking procedures for obtaining good current distribution. For a given current density, complete coverage can be obtained only over a limited range of temperature. For example, if the process is operated at 80 amp/ft,[2] a temperature of 60° C (140° F) is required to obtain complete coverage of panels. At lower temperatures, the panels are bare in the vicinity of the edges. At higher current densities, the minimum temperature required for complete coverage is higher. However, there are indications that temperatures above about 75° C (167° F) yield coatings having poorer corrosion protection.

Salt Spray Corrosion Resistance

Resistance to salt spray corrosion is the outstanding characteristic of coatings produced in alkaline chromate baths. The corrosion resistance of coatings from many baths of various compositions, including the HAE and the acid chromate, was compared with that of coatings produced from the alkaline chromate bath, and the latter coatings were as good as or superior to any of those tested. For example, 4 inch x 4 inch magnesium alloy panels were coated in the alkaline chromate bath for 30 minutes at a current density of 120 amp/ft[2] and at a temperature of 65° to 75° C (149° to 167° F). For comparison, panels were coated in the HAE bath for 90 minutes at a current density of 30 amp/ft[2] and a temperature of 20° to 25° C (68° to 77° F). Other panels were also coated in the acid chromate bath for 10 minutes at a current density of 40 amp/ft[2] and at a temperature of about 75° C (167° F). All panels were cut from the same sheet of FS alloy. None of the coatings was given any post treatment.[3] These panels were then exposed to salt spray in equipment operated in accordance with Federal Specification QQ-M-151, for 12 days. The average number of corrosion spots was 6, 9, and 49 for the panels from the alkaline chromate, HAE, and acid chromate baths, respectively. Also for comparison 4 inch x 6 inch FS 1 alloy panels coated by the HAE process were obtained from Frankford Arsenal. The panels had been given the regular post treatment consisting of a hydrofluoric acid dip followed by baking in a highly humid atmosphere. These panels were exposed to salt spray for 29 days. They were then stripped, recoated by the alkaline chromate process, and again exposed to salt spray for 29 days.

Corrosion spots are tabulated in Table II for the post treated HAE panels and the same panels stripped and recoated with the alkaline chromate coating (no post treatment):

TABLE II. SALT SPRAY CORROSION SPOTS ON HAE PANELS WITH POST TREATMENT AND SAME PANELS STRIPPED AND RECOATED BY ALKALINE CHROMATE PROCESS

Days Exposure	HAE Panels					Alkaline Chromate Panels				
	A	B	C	D	E	A	B	C	D	E
2	0	1	0	1	0	0	0	1	0	0
7	1	2	1	4	1	0	1	1	0	0
15	2	2	1	4	1	0	1	1	0	0
22	2	2	1	4	1	1	2	1	1	4
25	3	4	2	5	1	2	4	2	3	4
29	3	6	2	6	1	4	6	5	5	11

It will be noted that for exposure periods up to and including 15 days, the alkaline chromate coating gave equivalent or better protection than the post treated HAE coating on the same panel. For longer periods of exposure the difference between the protective value of the two coatings was less distinct.

Effect of Process Variables on Corrosion Resistance

Alkali concentration: Satisfactory coatings are not obtained from chromate solutions containing an alkali concentration below about 0.1 molar. Corrosion resistance improves as the alkali concentration is increased from 0.1 M to 0.2 M. Very little change occurs above a concentration of about 0.2 M. Some data are given in Table III.

TABLE III. RELATION OF ALKALI CONCENTION OF BATH TO SALT SPRAY RESISTTANCE OF COATINGS DEPOSITED FROM A BATH CONTAINING 1.0 M CHROMATE

NaOH Concentration (Molar)	Thickness (Mils)	Corrosion Spots (28 Days Exposure)
0	Unsatisfactory	—
0.1	1.6	55
0.2	1.7	41
0.3	1.7	36
0.5	1.7	43

ELECTROLYTIC COATINGS on Magnesium Base Alloys

Chromate concentration: A coating can be obtained from alkali solutions which contain no chromate. However, the resistance to salt spray corrosion is poor. Corrosion resistance increases very rapidly as the chromate concentration is increased up to 0.1 M. It increases more slowly between a concentration of 0.1 M to 0.4 M and shows no appreciable improvement above a chromate concentration of about 0.4 M. Typical data are given in Table IV.

TABLE IV. RELATION OF CHROMATE CONCENTRATION OF BATH TO SALT SPRAY RESISTANCE OF COATINGS FORMED FROM A BATH CONTAINING 0.3 M ALKALI

K_2CrO_4 Concentration (Molar)	Coating Time (Minutes)	Corrosion Spots (4 Days of Exposure)
0	20	100
0.1	20	14
0.2	20	13
0.3	20	13
0.4	20	6
0.8	20	6
1.2	20	5
1.6	20	5

Current density and temperature: As indicated earlier, proper matching of current density and temperature is required to obtain complete coverage. The two variables also affect the protective value of the coating in the salt spray. Variations in current density between 80 and 140 amp/ft^2 have little effect on the corrosion resistance of the coating in the salt spray, but lower current densities yield coatings of inferior protective value. Higher current densities have not been tried. Increasing the temperature above that required for complete coverage tends to reduce the protective value of the coating in the salt spray.

Period of electrolysis and thickness of coating: Increasing the process time increases the coating thickness. As the time of electrolysis is increased up to about 30 minutes, at which time the thickness of the coating is about 1.6 mils, the corrosion protection of the coating improves. Further increase of time has only a minor effect on the corrosion protection offered by the coating and after periods longer than about 60 minutes the coating flakes off in the bath.

Basis Metal

The protective value of the coating is influenced by the basis metal. Different lots of magnesium alloys of the same type apparently differ sufficiently to affect the corrosion resistance of the coatings. Results of salt spray tests varied widely on coatings applied, from the same bath under the same operating conditions, to FS 1 alloys obtained from different sources. For examples, one coated FS 1 alloy corroded after 5 days' exposure while another showed no corrosion until after 40 days' exposure.

HAE coatings applied to FS alloys obtained from different sources also showed differences in the protection afforded to the basis metal. Some of the differences obtained may be illustrated as follows: Duplicate panels (4 inch x 4 inch) of FS and FS 1 alloys were coated by the HAE process (sealing treatment omitted) and by the low voltage, alkaline chromate process. These panels were exposed to salt spray for 12 days. Results obtained were:

Lot	Alloy	Corrosion Spots HAE Process	Corrosion Spots Alkaline Chromate Process
1	FS 1	16	0
1	FS 1	12	0
2	FS	10	5
2	FS	7	7
3	FS 1	7	1
3	FS 1	9	0

Chemical Composition of Coatings

Since the process is basically an anodizing one, the major constituent of the coating is some mixture of magnesium oxide and its hydrates. Also present are hexavalent and trivalent chromium compounds. Analyses of four coatings are summarized in Table V. These coatings were prepared in a bath of 0.3 M in alkali. The chromate concentration in the bath was varied from 0.1 M to 1.5 M.

These analyses indicate that in the coatings both the total chromium content and the fraction in the chromate state increase as the concentration of chromate in the bath is increased.

Effect of Additions to Alkaline Chromate Bath

Various compounds such as KF, $Al(OH)_3$, K_3PO_4, KNO_3, NH_4NO_3 and $ZnSO_4$ were added individually and in com-

TABLE V. ANALYSES OF COATINGS FROM ALKALINE CHROMATE BATHS

Coating	Thickness (Mils)	Chromate Conc. in Bath (Molar)	Cr^{+6} Per Cent	Total Cr Per Cent	Mg Per Cent	CO_2 Per Cent	Loss on Ignition over Bunsen Flame Per Cent
1	1.8	0.1	0.26	0.68	36.7	4.4	37.6
2	1.4	0.5	0.52	1.05	36.2	4.6	38.4
3	1.2	1.0	0.72	1.36	36.1	4.8	37.1
4	1.4	1.5	1.00	1.78	36.1	3.9	35.8

binations to baths containing potassium hydroxide and potassium chromate. Few of the resulting coatings were as resistant to salt spray as those obtained from the simple alkaline chromate bath and none was significantly better. Some of the baths, however, yielded coatings which appeared to be harder, especially baths containing (1) aluminum hydroxide, and (2) potassium nitrate and potassium fluoride.

Coatings similar in appearance and comparable in salt spray corrosion resistance were obtained from baths in which sodium silicate ($Na_2SiO_3.9H_2O$) was substituted for the hydroxide.

Coatings Applied with Direct Current

A uniform coating can be formed on a magnesium anode in a 0.3 M solution of KOH with direct current instead of alternating current. Addition of K_2CrO_4 results in formation of spongy deposits in localized areas but an increase of the alkali concentration to about one molar yields uniform coatings. Such a bath, operated at 70° to 75° C (158° to 167° F) with a current density of 34 amp/ft[2] for 30 to 45 minutes, produced uniform coatings on FS alloy panels. In salt spray tests, however, these coated panels were somewhat inferior to those coated in the standard a-c bath.

Organic Coatings for Application Over Electrolytic Coating

Data are not available at present for recommending the best paint system to be used. A few laboratory tests indicated that adhesion of organic coatings to the electrolytically formed ones was satisfactory if not subjected to bending or flexing. Over anodized coatings, 0.5 ml or less in thickness, paint coatings remained intact when panels were bent. Over thicker coatings, however, loss of adhesion of the paint coatings occurred on bending because of failure of the electrolytically formed coating.

Sealing Treatment

Sealing treatments are normally used with the HAE and anodized aluminum coatings and it is expected that they will be advantageous with the alkaline chromate process. As yet little work has been done on this phase of the problem.

Summary

The low-voltage alkaline chromate process which has been described produces a protective coating on magnesium alloys which is comparable to the coatings produced by the acid chromate and HAE processes. Salt spray tests indicate that the protective value of this coating, without the benefit of fluoride sealing treatment, is about the same as that of the HAE coating which has been given the sealing treatment.

The three processes mentioned represent considerable progress in the problem of protecting magnesium alloys. As more research is carried out in the relatively unexplored field of anodized magnesium alloys, further progress is expected.

Acknowledgment

The authors wish to thank the Office, Chief of Ordnance and Frankford Arsenal which helped support the work described.

[1]"HAE Coatings for Magnesium," H. A. Evangelides, Product Finishing 7, 54-60 (October, 1954).

[2]Robert W. Buzzard, U. S. Patent 2,314,341, March 23, 1943.

[3]The HAE process normally includes a fluoride post-treatment or sealing treatment which yields a two-fold increase in corrosion protection

Ogburn

Fielding Ogburn is Assistant Chief of the Electrodeposition Section of the National Bureau of Standards. B.S. in Chemistry in 1941 from the University of Chicago. Served in the Army in Italy in World War II. Joined Dr. Blum's group at NBS in 1946. Delegate and Past President of Baltimore-Washington Branch, AES. Director AES Project 13. Chairman Washington-Baltimore Section of the Electrochemical Society. Chairman Subcommittee I of ASTM Committee B-8.

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Editor's Note—Mr. Kronenberg is now in the Navy and his picture and biography unfortunately are not available at this time.

AES RESEARCH and the Men Behind It

Plating Staff Photo

TOOLS OF RESEARCH

By

ARCHIMEDES DORIA
EDITOR

According to Webster "research" is derived from the French "Recherche" which in English roughly means "reseek"; then the dictionary continues with several definitions among which are: "Careful and diligent search; studious inquiry or examination; specif. and usually, critical and exhaustive investigations or experimentation having for its aim the discovery of new facts and their correct interpretation, the revision of accepted conclusions, theories, laws, in the light of newly discovered facts, or the practical applications of such new and revised conclusions, etc."

One might read such definitions over and over again and still fail to understand the full meaning of the word. One might seek out a thousand researches and researchers and still fall short of the myriad subtleties of the field. This is because research is as different as the men who practice it, because each project has a special character in itself which must require a different outlook and approach from the different men who are involved. But what then is research and who are these men and who must they be?

Research cannot rely on quantity and must therefore justify itself qualitatively. It requires not only a high degree of scientific ability but personal and intellectual integrity as well; it requires imagination and it requires, too, humility in the face of the impenetrable mysteries of science. It is, in short, a scientific *art*.

A really good researcher requires special skill and special insight. It is not enough that he know the cold facts of science, but he must have the patience to track down their meanings, their applications, their inter-relations. He must be devoted to ideals as high as any ever defined by men for he must believe in an ever-continuing capacity for progress; he must believe in man and in man's ability; he must believe in the implements of science for he travels an uncharted road that leads to vague goals—which may elude him or prove non-existent.

Hence a good researcher needs patience and devotion implemented by a quiet courage that allows him to probe ever deeper into the dark unknowns of human knowledge. He must be a man who can work apart from the impatient, maddening crowd and remain cool and clear of head even as ululant cries rise from the mobs that forever demand the excitement of new adventure, new tools, new methods, new horizons, new worlds.

Research has been the handmaiden of industry which would still be floundering about without direction had not research come to the rescue long ago. The goal of research is to help industry and society find a straight path through the maze and confusion of modern science. This has been its greatest fulfillment even as its somewhat mysterious facets continue to taunt and challenge men's imaginations.

In these matters the AES has for many years led the way. The Society has been willing to match patience and understanding with these men; has supported their work and encouraged them in it; has called upon industry and government and individuals and society to join the long thin line of devoted men who hide in smelly labs and chase down the secrets of nature to transform them into controllable scientific methods. In this the AES may well be proud.

Through the years the men on the Research Committee have remained loyal to the highest ideals of the Society. They have nurtured the program through headache and heartache, through lack of funds and publicity, and other shortcomings, to the unswerving, guaranteed, complete program of the present. In these years they have made electroplating the undisputed leader of a field in which but a short time ago it was considered a rather expensive method for doing something which most men preferred to do by hot dip or other processes. Research has transferred the field from a hit-or-miss method to a carefully controlled, completely scientific process.

But let us let the men themselves speak to us through the records:

In 1948 Dr. Richard M. Wick, chairman of the Research Committee reported, "Research results that are of immediate use are generally of most interest. Such results have been obtained and are being developed at increasing rate as the respective research projects mature. As chairman, I thank the Research Committee and its Project Committee, the Executive Board, and the loyal individual and Sustaining Membership of our Society for their continued support that has permitted the research program thus to develop."

Dr. Louis Weisberg, in 1949: "Research papers are necessarily technical in character. While every effort is being made to present the results in a simple and straightforward manner, they must still be on a high technical level. . . . The Research Committee has been aware of this need and has given the matter considerable thought."

W. M. Tucker, in 1950: ". . . the research program must remain free from

bias and should yield an advantage to no interest other than the whole . . . although it is becoming evident as the program grows that some modifications must be made with regard to utilization and indirect evaluation of proprietary processes."

Dr. W. A. Wesley, in 1951: ". . . it takes one or two years of a fellowship to prepare a literature review, get into experimental work, achieve an experimental objective, prepare a technical paper, clear the paper through the Research Committee, and finally have it reach its place in the publication schedule of PLATING."

Dr. Donald Price, in 1952: "It should be pointed out that it is far from a simple matter to set up a new AES Research Project. There are only a limited number of universities and institutions having men competent to direct such projects."

Dr. Donald Price, in 1953: "In last year's report, attention was called to the scarcity of students available to accept Fellowships for work on AES Projects. The situation is becoming more serious as time goes on . . ."

Dr. Earl J. Serfass, in 1954: "As a result of (this) somewhat more active program, and further, as a result of earlier efforts of the several project directors, and project directing subcommittees, the information made available through research papers during the past year has been more valuable than ever. It appears that the membership will be assured a steady flow of immediately useful and also fundamental research data from the projects which have been active during the past year."

And so, the continuing words that can but reflect a small projection of the cold hard facts, the obstacles, the successes, the plans and the hopes are recorded by the men who have led the Research Program through the years. And those of us who stand on the sidelines can but faintly guess at the tremendous problems these men modestly meet and solve each day. We should take off our hats in appreciative salute and pray that there will always be among us men of research to carry out in freedom and scientific honesty the program we of the AES make possible through the efforts of the Society and its Sustaining Membership.

Project No.	*Location*	*Project Director*	*Subject*	*Remarks*
1	UNIVERSITY OF INDIANA	F. C. Mathers	Stripping of Copper from Various Base Metals	Concluded
2	LEHIGH UNIVERSITY	Dr. E. J. Serfass	Determintion of Impurities in Electroplating Solutions (Process Control Handbook)	Concluded (Active)
3	UNIVERSITY OF MICHIGAN	A. L. Ferguson	The Adhesion of Electrodeposits	Concluded
4	U. S. TIME CORPORATION	G. J. Kahan	Effect of Surface Finishing of Nonferrous Base Metals on the Protective Value of Plated Coatings	Conoluded
5	MICHIGAN STATE COLLEGE	D. T. Ewing	Effect of Impurities and Purification of Electroplating Solutions	Active
6	PRINCETON UNIVERSITY	N. Thon	Porosity of Electrodeposited Metals	Concluded
7	PENNSYLVANIA STATE UNIVERSITY	Dr. H. J. Read	Methods for Testing Thickness of Electrodeposits	Concluded
8	CLEVELAND GRAPHITE BRONZE CO.	Dr. R. A. Schaefer	Polarization and Overvoltage	Concluded
9	NATIONAL BUREAU OF STANDARDS	Dr. A. Brenner	Physical Properties of Electrodeposited Metals	Concluded
10	YALE UNIVERSITY	B. F. Dodge	Disposal of Plating Room Wastes	Active
11	EVANSVILLE COLLEGE	J. Kronsbein	Current and Metal Distribution in Electrodeposition	Concluded
12	COLUMBIA UNIVERSITY	H. B. Linford	Cleaning and Preparation of Metals for Electroplating	Active
13	NATIONAL BUREAU OF STANDARDS	F. Ogburn	Correlation of the Weathering Behavior of Electrodeposited Coatings with Their Permeability to Gases	Active
14	ONTARIO RESEARCH FOUNDATION	Dr. A. E. R. Westman	Effect of Basis Metal Condition on Plating	Active
15	DETROIT AREA	———	Accelerated Corrosion Test	Active

Books

Order all books AES, 445 Broad Street, Newark, N. J. Please remit check or money order.

Directory of Commercial and College Testing Laboratories. 48 pages. ASTM. $1.00 to non-members, $.75 to members.

This Directory is a successor to the *Directory of Commercial and College Laboratories* published in 1947 by the U. S. Department of Commerce, National Bureau of Standards, as Miscellaneous Publication M 187. Responsibility for its compilation and publication has been transferred from the National Bureau of Standards to the American Society for Testing Materials by agreement between the two organizations.

The Directory lists the locations of testing laboratories equipped and prepared to undertake testing on a commercial or fee basis. Information is given concerning 278 commercial testing laboratories and their 151 branches or offices. There is also presented a list of the laboratories of 86 colleges that are prepared to do testing under certain conditions. Research and consulting laboratories are not listed unless they also are engaged in testing on a commercial basis.

Using a code system of letters and numbers, a maximum of information is given in a minimum of space. The Directory will give the user a good indication of the laboratories most likely to be prepared to undertake the tests desired. It does not pinpoint every possible test within the many laboratories, but when used as the guide it is intended to be the user can readily select the nearby laboratories which will most likely be able to fulfil his testing needs.

Chemical Process Principles, Part I. By Olaf A. Hougen, Kenneth M. Watson, and Roland A. Ragatz. John Wiley & Sons. 539 pages. $8.50 to non-members, $7.22 to members.

Part I of this three-volume work, which concentrates on material and energy balances, brings together the important principles of physical chemistry and stresses their practical application. With this objective again in mind, the authors have completely revised their material on physical and chemical constants and provide a new correlation of critical constants. Up-to-date information is supplied on material balances in stagewise extraction and new discussions appear on equilibria in ternary systems, material balances in stepwise countercurrent processing, and thermochemistry of nuclear reactions. Illustrations and examples keep pace with this late information.

In addition to two entirely new chapters on mathematical procedures and adsorption, the contents include: stoichiometric and composition relations, behavior of ideal gases, vapor pressures, humidity and saturation, solubility and crystallization, material balances, thermophysics, thermochemistry, fuels and combustion, and chemical, metallurgical, and petroleum processes.

Drs. Hougen and Ragatz are professors of chemical engineering at the University of Wisconsin and have had extensive industrial experience. Dr. Watson, vice-president and director of research of the Pure Oil Company, was also at the university for several years. Part II of their work, dealing with thermodynamics, and Part III covering kinetics and catalysis, were both published by Wiley in 1947 and are priced at $6.00 ($4.00 to members) and $5.25 ($3.50 to members) respectively.

Introduction to Atomic and Nuclear Physics by Henry Semat. 561 pages. Rinehart and Co. $6.50 to non-members, $5.85 to members.

As the title implies, this book introduces the physics student to the atomic and nuclear branches of his subject. This book is called a third edition, but actually is so enlarged in scope, especially in the sections on nuclear physics (in line with the actual developments of this field in the last twenty years) that it might be called a new book just as accurately.

Elements of Statistical Mechanics by Dirk ter Haar. 468 pages. Rinehart and Co. $8.50 to non-members, $7.65 to members.

This is a text for the advanced undergraduate or the graduate student of physics. In it, history, theory and application of statistical mechanics is presented clearly and exactly, starting with the Maxwell distributions and covering the grand canonical ensembles of Gibbs.

The Fundamentals of Electrochemistry and Electrodeposition by Dr. Samuel Glasstone. AES publication. 90 pages. $2.75 to non-members, $2.50 to members.

This manual condenses into compact, practical handbook form the authentic essentials of the science of electroplating. Dr. Glasstone's book is a compilation of the much-discussed series of articles which appeared during 1944 in the *Monthly Review*. The material has been completely revised in the light of World War II developments to provide practical daily usefulness to schools, colleges and every serious electroplater.

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Chrome plating of tubular pieces for pens and pencils is done in individual chrome plating tanks. Lucite bars position the rack in the tank and insulate the anode from the cathode poles

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CAREFUL PLATING AND POLISHING OPERATIONS MAKE FOR BEAUTY AND DURABILITY

Solid gold pen caps and pen barrels for pens and pencils are finished by hand on smaller buffing wheels such as these. After the buffing they are carefully inspected for any possible flaws

An automatic clip polishing machine puts the finishing touches to pen and pencil clips after they come from the plating room. A loading disc on the machine moves back and forth across the buffing wheel, utilizing the full face of the wheel

By

HARRY WEHMEYER

Ever since W. A. Sheaffer invented the first lever filling device for fountain pens in the backroom of his Fort Madison, Iowa, jewelry store in 1908, the idea of making a pen along the same lines as a piece of fine jewelry has been an inherent part of the Sheaffer Pen Company's philosophy.

As a result, particular attention is given not only to the external appearances of the pen but also to those parts which, while not apparent, contribute much to the efficiency and quality of the pen. It is this hidden value which gives long life and service to pens.

But in addition to the quality and craftsmanship that have been combined to make Sheaffer pens the leader among quality writing instruments in this country, unusual attention is given to eye appeal as well as to functional efficiency such as is found in the new Snorkel fountain pen with the extensible tube that eliminates dunking the point during filling.

Because of this, finishing operations at the company's new $3,500,000 plant are diverse, yet highly mechanized. In the plating and polishing department, for example, are found several interesting applications of finishing equipment.[1] Before the introduction of the tough new L-607 alloy pen point it was necessary to build a special automatic polishing machine to handle the new point. Three soft felt cut-down wheels and one muslin coloring wheel, all operating at 10,200 ft/min are used on the machine to impart a mirror-like finish to the hard white metal. A special bar type compound is applied to the wheels by air operated applicators. Variable speed drives on the work spindles,

bull wheel and compound applicators make this a highly flexible machine, suitable for polishing parts of various shapes.

A second machine[2] is used for polishing pencil tip blanks at the rate of 3,000 per hour. This machine has three 10-inch diameter 80–92 thread count muslin wheels which revolve at 5,400 ft/min, and 24 work spindles. The pencil tips are loaded manually but are unloaded by an air blast which blows the tips down a rubber tube into a tote box.

Still another specially designed machine is used for color buffing gold filled pen and pencil clips. The clips are mounted on a rotating disc which moves across a muslin polishing wheel to which a gold coloring rouge is applied. The wheel is made up of sections of 80–92 muslin and is run at 3600 ft/min. As the clips are being polished, the loading disc moves back and forth across the face of the polishing wheel, using the full face of the wheel, thus assuring a uniform polish on the clips.

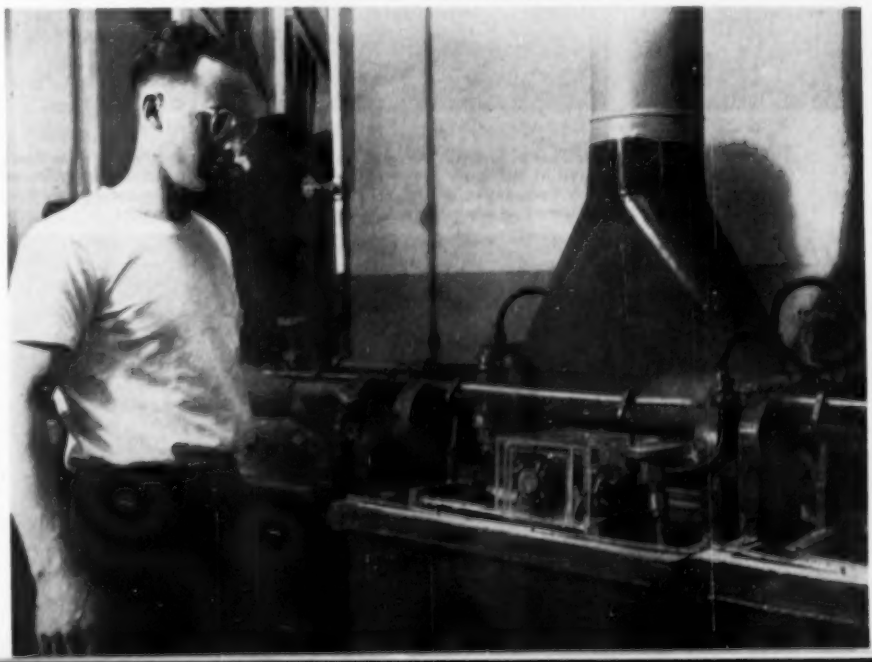
Non-nickel bearing stainless steel cap blanks are polished to a mirror finish on two automatic polishing machines, each of which has three 18-inch diameter muslin wheels operating at 7500 ft/min. The development of a special cut and color compound permits the complete polishing of the caps in one operation without the objectionable blue cast imparted to stainless steel by some polishing techniques. Nine hand polishing lathes are used for finishing operations on solid gold, non-nickel bearing stainless steel and other metals.

The plating section of the department

Floor is tiled with special acid resisting tile and sloped to carry off any water or liquids that spill. A system of duckboards set flush with the tile floor simplify cleaning the drainage trenches which carry away spilled water and liquids

The unfinished nibs are placed on the revolving spindles which rotate on a circular wheel as they pass through the automatic compound applicators and the buffing wheels. An air stream slips the polished caps off the spindles and carries them off to a tray eliminating fingerprints

A workman adds potassium gold cyanide solution to the three barrel gold alloy plating unit to gold plate pencil tips, bands, caps and other pen and pencil parts. The nickel content is maintained throughout the plating by use of nickel anodes while the gold content is kept at a uniform level through the addition of the potassium gold cyanide



A Sheaffer Pen Company workman checks on pen caps as they move through a three headed automatic buffing machine. The machine also is used to impart a high finish to other pen and pencil parts

All plating tanks and operations which give off fumes or steam are equipped with individual exhaust hoods. In this chrome plating installation the exhaust hood carries off steam from a cleaning tank

The most exacting of all the precision tasks performed in making Sheaffer fountain pens are handled by the employees in this large gold nib department. Because of the exacting character of the work, these skilled craftsmen rely primarily on illumination from the bench lights which they can personally control.

The millions of fabricated metal fountain pen and pencil parts which are plated for permanence are tumbled and polished in this room at one end of the large Plating and Polishing Department of the Sheaffer Pen Company. Special acid resisting bricks have been used in the floor, which contains a network of duck-board covered drainage trenches

has been especially designed for efficiency and employee comfort. Floors are constructed of acid-proof brick, sloped so that liquids run off quickly into duck-board covered drains. This system eliminates the need for floor racks with their attendant inconveniences. All tanks, except cold water rinse tanks are equipped with exhaust hoods, so that even steam from hot water or alkali cleaner tanks is not allowed to contaminate the atmosphere. In addition, the plating and polishing department, like the rest of the factory and main office building, is completely air conditioned.

In the barrel finishing room, 12 standard and specially built barrels are used for various deburring and burnishing operations. A typical procedure is that of finishing eraser cups, the steel cup-shaped part used to hold the eraser in the pencil. Approximately 100,000 cups, as received from the punch press department, are placed in a tilt-tumbling barrel with 10 pounds of 0½ grade pumice stone and five gallons of water. After tumbling for 24 hours, the cups are cleaned and burnished for an additional 24 hours in a submerged burnishing barrel containing hardened steel shot, burnishing compound and a small quantity of sodium cyanide. The parts are then plated with copper, nickel and finally gold.

Approximately 50,000 pieces are nickel and chrome plated each day in the plating section of the department which also manufacturers and repairs all racks and plating fixtures.

In addition to handling the plating of pencil and pen parts, the plating and polishing department also hard chrome plates such things as molding dies, drills, taps, reamers, etc. By use of special jigs and accurate control of time cycles the department has found it possible to control plating thicknesses to within 0.00005 of an inch, thus eliminating the necessity of grinding plated parts to size in most cases. Thicknesses of up to 0.017 of an inch are supplied to some tools.

As a result of increased efficiency through new and improved plating and polishing techniques and controls, rejection rates for the entire department have been reduced to approximately one per cent for all causes.

*W. A. Sheaffer Pen Company, Ft. Madison, Iowa.
[1]Much of it designed and manufactured by Sheaffer tool and diemakers.
[2]Also Sheaffer built.

aes research project no. 14

THE INFLUENCE OF THE PHYSICAL METALLURGY AND MECHANICAL PROCESSING OF THE BASIC METAL ON ELECTROPLATING

Critical Review of the Literature—Part I (Second Section)

By A. E. R. Westman* and F. A. Mohrnheim†

A. Polishing

(a) *Introduction*

This section is concerned largely with a critical review of the literature relating to the effect of the commercial polishing of steel on the properties of electroplate, and particularly with those investigations in which an attempt is made to correlate variations in an industrial polishing procedure with the corrosion resistance properties of electrodeposited nickel on steel. The term "polishing" is here used in the current industrial meaning of the term in America and is equivalent to "bobbing" in England. Buffing, in which a cloth wheel and only a very fine abrasive dispersed in a binder is used, will be treated later. This is called "mopping" in England.

An indirect approach to the problem is to study the nature of polished layers on metal. This will be discussed in Section 5.

(b) *Purpose of Polishing*

In practically all cases the appearance of a plated article must comply with certain requirements of smoothness, gloss and reflectance. In most commercial practice, if the formed steel article were merely cleaned and plated by usual procedures, these requirements would not be met either because of initial roughness of the steel or because of die marks, scratches, orange peel, etc., introduced in the forming. It is necessary either to remove or smear out elevations in the basis metal surface, to adopt plating and buffing practices which will fill in the depressions, or to combine these proceedings. The former course is usually adopted and a polishing and sometimes a buffing procedure introduced prior to the cleaning operation.

(c) *Methods*

Polishing procedures may be classified into (a) mechanical polishing, (b) electropolishing and (c) chemical polishing.

(a) *Mechanical Polishing* involves the use of abrasive grains glued or cemented to a cloth, felt or leather wheel or a cloth or paper belt. The fineness of an abrasive is indicated by a grain-size number, which corresponds roughly to the number of meshes per linear inch in a sieve through which most of the abrasive will pass.

A "dry", "oiled" or "grease" finish is produced by using a wheel or belt in a dry condition or by applying oil or a grease, such as tallow, respectively to the wheel or belt.

(b) *Electropolishing* is used in smoothing surfaces which already have a finish corresponding usually to 180 grain or better. The surface to be smoothed is treated anodically under conditions causing a levelling rather than an etching action. This distinguishes the process from anodic pickling. A bibliography is given by Faust.[156] He considers an essential condition is a bath of such a composition that a film is formed over the anode surface which produces a voltage difference high enough to cause more rapid attack on elevated portions. Under ideal conditions, surfaces with profilometer rms values of 2-3 micro-inches may be produced.

(c) *Chemical polishing*[157] is similar in effect to electropolishing except that no current is used. It is more frequently applicable to nonferrous alloys and metals than to ferrous.

(d) *Effect on Properties of Deposit*

Most of the literature dealing with the effect of variations in the basis metal on the properties of the deposit is concerned with the effect of variations in the polishing procedure.[27,64,102,103,151,114,127,159,164,167,176,181] In particular, their effect on the corrosion resistance of nickel-plated steel has been the subject of much discussion and investigation.

The two papers bearing most directly on the effects of variation in the polishing procedure are those of Pinner (1940)[114] and Lux and Blum (1945).[127] Although Pinner's investigation was exploratory in character, it led to the conclusion that the sizes of grain used in polishing the basis metal markedly affected the corrosion resistance of the nickel plate. He suggested a more detailed investigation. Lux and Blum made a more thorough and detailed investigation which led to exactly the opposite conclusion that the corrosion resistance of the nickel plate was unaffected by wide variations in the grain sizes used in the polishing operations. Because of this apparent conflict, a detailed discussion is in order. It is possible that there is no real conflict between the results of these two investigations. Indeed, this was pointed out by Lux and Blum in discussing their conclusion.

In planning an investigation of this kind, the experimenter has a rather wide choice of the properties of the basis metal, the cleaning and plating conditions and the methods for evaluating the corrosion resistance of the nickel plate. It is possible that the choice made of these conditions may determine whether or not the variations in polishing procedure introduced will be reflected in the corrosion data obtained.

In both these investigations, the roughest surfaces used has a profilometer rms value that was a very small percentage of the thickness of plate applied so that any effect on the properties of all but the initial layers of plate would have to be due to either (i) a deposition mechanism such that discontinuities or disturbances in the initial plate tended to carry up through the plate or (ii) slivers or jagged edges of metal which penetrated much farther into the plate than the profilometer reading would indicate. It is conceivable that condition (i) could be demonstrated more readily with a crystalline Watts nickel deposit than with bright nickel. It is also possible that condition (ii) would be encountered more frequently with one type of steel than with another, although it is difficult a priori to say whether a high-carbon steel surface, on the one hand, or the soft ferrite surface of a low-carbon rimming steel on the other (see Section 2) would be more prone to this condition.

Pinner included specimens of three types of steel: (i) a high-carbon (1085) hot-rolled, heat-treated spring steel, designated "hot-rolled bumper steel", (ii) a low-carbon (1010) commercial grade,

cold-rolled steel, designated "commercial cold rolled", and (iii) a low-carbon (1010) selected grade cold-rolled steel, designated "'Perfect' cold rolled", with a highly finished surface. Twelve different polishing procedures were used. A group of from three to six specimens of each type of steel was subjected to each polishing procedure. A modified Watts nickel bath was used which produced a crystalline deposit and the unbuffed plated specimens were tested in a salt spray. Their corrosion resistance was evaluated by the Baker method, which assigns a higher number to a more resistant plate.

Pinner's data were reported in four tables which are reproduced in condensed form here as Table I.

Lux and Blum described their steel as a "special" SAE 1010 steel having a cold-rolled No. 3 finish and a No. 3 temper. It had a smooth bright finish and yielded profilometer readings of 2 to 4 micro-inches. Presumably, it would correspond with Pinner's "Perfect" cold-rolled steel, and consequently, on the basis of Pinner's data, would not be expected to show variations in corrosion resistance due to changes in the polishing procedure. Their conclusion "that wide variations in the polishing operations and in the contours of the steel surface prior to plating have no significant effect on the protective value of the plated coatings" is therefore not unexpected.

Lux and Blum point out that procedure

TABLE I. DATA OBTAINED BY PINNER
Effect of Basis Metal Polishing on Salt-Spray Value of Nickel Plate

Polishing Procedure No.	Grain Used								Salt-Spray Value			
									Steel*			
	90	120	150	150G	180	180G	220	220G	HR-1	HR-2	CCR	PCR
1	X								20	3	58	60
2		X							47	12	26	104
3			X						47	60	41	105
4							X		90	78	78	110
5	X	X							47	57	25	108
6	X	X	X						53	85	37	110
7	X	X	X	X					97	99	80	108
8	X		X		X	X		X	95	100	76	105
9	X						X	X	105	102	87	102
10		X					X	X	104	98	77	101
11			X				X	X	92	99	71	112
12							X	X	71	84	70	106

*HR-1—Hot-rolled bumper steel HR-2—Hot-rolled bumper steel recheck
CCR—Commercial cold-rolled steel PCR—"Perfect" cold-rolled steel

The first nine columns in the table define the twelve polishing procedures used; the last four give the salt-spray values, which were averages of from three to six specimens. Experiment HR-2 was a repetition of HR-1.

Although the data in column HR-2 do not duplicate closely those in HR-1, due undoubtedly to the difficulties inherent in salt-spray studies, nevertheless HR-1 and HR-2 agree in assigning higher values for procedures 7 to 11 inclusive and possibly 4, 6 and 12. This is good evidence for a polishing effect when working with hot-rolled steel.

Column CCR shows a much less striking comparison of the same kind but column PCR shows no effect so far as procedures 2 to 12 are concerned. It indicates that procedure 1 may give poor results.

It appears therefore that the type of steel determined not only the general level of values obtained but also whether those values reflected differences in the polishing procedures.

1 gave a low corrosion resistance in Pinner's investigation but not in theirs. They attribute that to a difference between salt-spray and outdoor corrosion tests. Another possible explanation for this discrepancy, if indeed it exists, is that Lux and Blum used either bright nickel or slightly buffed dull nickel on the set finished with 90 grain; Pinner used unbuffed dull nickel.

Lux and Blum also refer to the conclusions of Phillips (1936)[88] and Hothersall and Hammond (1938)[102] that roughly polished surfaces yield more porous deposits and suggest that there were more inclusions in the steels used by these authors. Phillips used "cold-rolled auto-body steel of good quality" and carried out an investigation similar to that of Pinner but less extensive. Only a single grain size was used on any one specimen. Grits 46, 80, 120, 180 and 240 were used. This series corresponds to Pinner's polishing procedures 1 to 4 but covers a wider range of sizes. A navy type salt-spray cabinet was used. This had been baffled so as to give duplicate values.

Phillips found that polishing the basis metal reduced the corrosion resistance of the plate. Some panels which had only been buffed prior to plating gave the best resistance. The specimens polished with the finer grits showed a more localized attack. His data are possibly not at variance with Pinner's in that the latter does show indications that single coarse grits give poorer values with cold-rolled steel. Both Phillips' and Pinner's investigations were preliminary investigations that led to that of Lux and Blum. It is possible that the auto-body steel used by Phillips was thinner than that used by Lux and Blum and that the coarse abrasives tended to cut through the surface layer of ferrite. In the discussion of Phillips' paper, Wagner referred to salt-spray tests of bumber guards where failures occurred at nicks and imperfections in the basis metal regardless of the plate thickness used. Hogaboom suggested that oxides rolled into the steel in the initial hot rolling escaped the pickling operation and were covered over in cold rolling. Coarse abrasives would then uncover them.

In more recent investigations, Pinner[135] has been concerned with slivers and jagged edges of metal produced by abrasive polishing of steel and their effect on the corrosion resistance of electrodeposited coatings. Photomicrographs of slivers from 3 to 6 thousandths of an inch long were obtained as well as nodules of nickel plate containing steel slivers. There was evidence that slivers tended to orient themselves perpendicular to the basis metal during the plating operation. They were not removed by normal cleaning procedures. In experimental work it was found that basis metal defects in the steel available at that time obscured all other effects despite any mechanical polish or normal cleaning procedure. When this difficulty was overcome, it was possible to evaluate various cleaning procedures. Pinner recommended a cleaning procedure involving an anodic acid etch, a rinse, anodic alkaline cleaning to remove smut, a rinse and a mild muriatic acid treatment. Cold-rolled steel panels not subjected to polishing gave the best results but polishing was considered necessary in practice to remove defects due to handling and fabrication.

Pinner stressed the importance of having nothing but smooth contours on the basis metal and attributed the superiority of the finish produced by greased as compared to dry wheels to this factor. He did not present any data showing the frequency with which slivers occurred on an abrasive polished surface.

Hothersall and Hammond were concerned with the production of very thin, non-porous deposits of nickel on steel and found a rough condition of the surface to predispose to porosity. However, they found several other conditions normally present in commercial plating baths

to give difficulty also, so that their work with very thin deposits may not justify conclusions regarding commercial deposits. Presumably, they worked with dull nickel which may possibly have more propensity to show up irregularities in the physical structure and electrochemical properties of the basis metal surface than would bright nickel.

Steer[161,161a,175] has written extensively on the effect of the basis metal surface on electrodeposited coatings. He started a series of articles in Electroplating under the general title "Metallography of Electrodeposited Surfaces" but apparently stopped after four articles had been written. His approach to the problem and conclusions were summarized in an address published in the Australasian Engineer[161] and in a paper published a year later.[175]

Steer's approach to the problem was through metallography. He developed special techniques whereby (1) very true metallographic surfaces could be produced which justified working at high magnifications and (2) the etching of the specimen could be studied under high power by mixing a very dilute etchant with the immersion oil. Photographs were taken at 2000X and enlarged to 10,000X. Observation of the etching process enabled high energy areas to be recognized. His papers are largely a report on the experience gained by using this technique to study electrodeposited coatings under a variety of conditions. His conclusion is that "success or failure of electrodeposition rests almost entirely with the surface conditions existing on the basis metal". He contrasts a perfectly crystalline metal in which the atoms in each grain or crystal are arranged in a geometric lattice with the flowed layer produced by the usual polishing process in which a close approach to the purely amorphous condition is found. This layer is from 10 to 20 Å thick. It presents three conditions which are detrimental to electrodeposition: (1) minute cracks which penetrate it completely, (2) voids due to bridging and (3) planes of weakness both within the flowed layer and between the flowed layer and the underlying metal. Prolonged annealing is required for recrystallization.

To obtain a good plate, Steer believes that uniform deposition of atoms must be achieved in the first few seconds. He suggests that the ideal surface would be one of uniform and low energy content and that such a surface may be produced by the use of a mild etchant solution which dissolves the high energy surfaces preferentially and thus produces an equipotential surface.

Although Steer presents a well-reasoned discussion based on his observation of polished and plated surfaces, he presents no comprehensive practical data by which one can judge how well his conclusions are borne out in practice, but merely cites specific instances. If he is right in his contentions, then much commercial plating must be done on basis metal surfaces which will predispose to early failure. It is possible that most of the fragmented layers shown by Steer in his photomicrographs would be removed by a modern anodic sulfuric treatment. However, his conclusions accord with the generally held belief that a good cold-rolled steel surface gives better results if polishing can be avoided.

Faust[159, 167] discusses the surface preparation of the basis metal by electropolishing and chemical polishing. These are nonmechanical methods and may be contrasted with mechanical methods such as cold rolling and abrasive polishing.

In electropolishing, the outermost skin of the basis metal is removed by anodic attack in acid or alkali. According to Faust, reactions between the anode products and the electrolyte produces a film of high electrical resistivity which results in higher portions of the surface being attacked selectively and leads to smoothing of the surface. Without this film, electro-etching rather than electropolishing occurs.

Chemical polishing differs from electropolishing only in that no applied electric current is used.

The grain size of the basis metal Faust recommends is ASTM 9–10. He finds that 6–7 gives inferior results. If a metal of coarse grain size is cold formed, an orange-peel effect is produced which is not removed by the electrolytic treatment. Faust states that electropolishing removes all disturbed metal and enables plating to be done on the true structure of the basis metal, which he considers very advantageous. This is in line with Steer's conclusions. Faust further states that the structure, hardness and the other physical properties of the electrodeposited metal are influenced by the crystal size, orientation, condition of stress, etc., of the basis metal. He supports this statement by experiments in which nickel was electrodeposited on stainless steel (1) after metallographic polishing and (2) after electropolishing. The deposit on (1) was amorphous but that on (2) was crystalline and showed pseudomorphic continuation of the crystal structure of the stainless steel.

With Faust as with Steer, the question naturally arises as to how far it is necessary to go commercially in removing all disturbed metal from the basis metal surface.

Since surfaces can be produced by good cold-rolling techniques which are smoother than those ordinarily produced by polishing, the feasibility of eliminating the polishing operation completely has been the subject of discussion by Fulforth[102] and Hogaboom.[64] Fulforth states that with proper specifications for the steel and proper press shop methods no polishing is required prior to plating, even when considerable working is necessary in the manufacture of the part. In this case the basis metal sheets are oiled and interleaved with paper. This appears to be an increasing trend. In other cases where orange peel is produced by the forming operation and die marks are unavoidable, Hogaboom considers it more economical to remove these by a polishing operation rather than to lose nickel by excessive buffing of the plate.

Hogaboom[64] stresses the importance of the basis metal properties in electroplating. Cracking of an electroplate may be caused by the release of stresses introduced in the rolling or fabricating operations or by hydrogen embrittlement of high-carbon steels in plating, or cathodic cleaning or pickling. Worked surfaces, oxides and other contaminants often adhere more strongly to the deposit than to the basis metal. Invisible oxide films can lead to blistering, peeling and unexpected failure. A cold-worked surface may retard or prevent electrodeposition. Sometimes oxides which are rolled into the steel in the hot-rolling operations survive the subsequent pickling and are covered up in the cold-rolling operation. They may then be uncovered on polishing and cause difficulty in plating.

Boyer[161] states that studies in electroplating have been focussed primarily on the electrochemical reactions in the bath although metallurgical aspects relative to the composition and physical condition of the basis metal are also important factors. The alloyed layer between the basis metal and electroplate is too thin to be detected by the optical type metallurgical microscope but other techniques show that it is thicker than has been supposed. Basis metal surfaces differ in their chemical activity; those which corrode more readily are likewise easier to electroplate. The presence of the thinnest oxide film may prevent the necessary alloying to take place in electroplating. A low-carbon steel is the easiest basis metal to obtain free from oxide. A steel surface containing both pearlite (alternating layers of iron carbide and iron) and ferrite (iron) grains is ideal for plating and better than one consisting wholly of ferrite or pearlite since it is chemically more active. A fully-hardened, one per cent carbon steel consisting of martensite (iron and iron carbide) is least active and most difficult to plate. Tempering precipitates secondary carbide and increases the chemical activity. All straight carbon steels can be electroplated provided they are thoroughly cleaned and deoxidized. Blasting or other mechanical methods for removing oxides cut the surface so it can be more readily activated in the plating bath. Pickling in reducing acids (hydrochloric or sulfuric) is still one of the better means for making surfaces active. Oxidizing acids (nitric) tend to passivate. Most alloying elements decrease the surface activity of steel sur-

faces and slow down the alloying action in electroplating. Chromium in stainless steels is particularly active in this way. Grit blasting with pickling in reducing acids is the most effective treatment where permissible. Vapour blasting has been found to give a finely pitted surface which is very active. Cast iron is difficult to electroplate due to microstructure variations and graphite grains. Pickling with reducing acids and sand blasting are somewhat effective. The most effective but costly method is heating to an elevated temperature in reducing gases. This reduces the oxide and burns out graphite at the same time.

5. The Nature of a Polished Surface

(a) *Literature*

The literature relating to the nature of polished surfaces is quite extensive and by no means limited to the electroplating literature. Our bibliography includes more than twenty references and is not exhaustive. Many investigators have attempted to prove or disprove the presence of an amorphous or Beilby layer on a polished metal surface. The mode of polishing used in most of these investigations is a very light and cool polishing with extremely fine powders and probably bears little relation to the polishing and buffing procedure used by the electroplater.

(b) *Amorphous Layer*

Many investigations of polished metal surfaces have been made using X-ray and electron diffraction techniques. Although the latter may show diffuse rings which can be attributed to an amorphous layer, other interpretations[51,53] are possible. An excellent review and bibliography are given by Raether.[148] The distinction between an amorphous and a crystalline layer tends to disappear as the crystals become smaller. Individual crystals in a polycrystalline aggregate may have any size from macroscopic dimensions down to a few atoms. If the grain size is of the order of one structural crystal unit, there can be no repetition in the atomic pattern and the crystallinity is zero.

Many investigations by Bowden[59] and his colleagues at Cambridge University have shown that even in ordinary sliding friction at room temperature between metals, local welding and breaking of welds occurs. It is very likely, therefore, that melting occurs under the much more strenuous conditions of abrasive polishing and even buffing. Since it has not been found possible to quench molten metals to an amorphous state, one may conclude that while much disturbed and microcrystalline material occurs on a polished basis metal, there is unlikely to be an amorphous layer. Moore[139] attributes the almost amorphous nature of the flowed layer to inhibition of crystal growth by oxide particles incorporated into the layer during the flowing process.

From another point of view, the discussion of amorphous layers on a polished basis metal may be quite academic. The thickness ascribed to the layer, which gives diffuse electron diffraction rings on reflection, is usually less than a tenth of a micro-inch and it appears very unlikely that this layer would survive the modern anodic cleaning treatment usually given to steel basis metal.

(c) *Flowed Layer*

Although modern research has been unable to substantiate the presence of an amorphous layer, there is generally agreement that the crystal structure of a metal surface is greatly disturbed by a polishing operation. With abrasive polishing, this disturbance may reach to a thousandth of an inch or more. Near the surface, the crystal structure is broken down to sub-microscopic size and the metal smeared around to form a flowed layer two to three hundred micro-inches in thickness. This flowed layer is considered by Steer,[161,175] Faust[159,167] and other investigators to be detrimental in electroplating because of poor adherence between the electrodeposit and the flowed layer or between the flowed layer and the basis metal. It is considered to preclude any pseudomorphic continuation of the grain structure of the basis metal into the deposit, a condition sometimes stated to be necessary for good adhesion.

In the Lux and Blum investigation[147] panels of very smooth cold-rolled steel were used. These were polished on one side only. In preliminary work with mild cleaning techniques, poor adherence to the polished surface was encountered and was eliminated only when more drastic cleaning cycles were used. The unpolished surface showed good adherence at all times (Unpublished communication by Lux to the Project Committee). Steer cites instances where the flowed layer failed to adhere to the rest of the basis metal.

The question naturally arises as to what extent does or should this flowed layer be removed from the basis metal in order to secure a satisfactory quality of electroplate. Faust[159,167] and Pinner[195] have shown that it may be completely removed by electropolishing to expose the underlying grain structure of the basis metal. However, it is undoubtedly not completely removed in the majority of present-day cleaning cycles used in preparing steel for electroplating, although over the past ten years there has been a steady trend to more drastic cleaning of the anodic sulfuric or electropolishing type. Pinner[195] advocates rather strong electrochemical cleaning procedures but on the basis that it removes splinters, sharp edges and loosely adherent material rather than removal of the flowed layer.

In contrast to polishing, there is reason to believe that the cold-rolling process does not result in a flowed layer of metal on the surface but rather that surface grains are flattened out and oriented with certain planes tending to lie parallel to the surface. The annealing at various stages in the rolling process also permits a recrystallization of the steel and the removal of stresses and strains. Steer[161,175] finds that annealing does not cause similar recrystallization of the metal in the flowed layer produced by polishing.

(d) *Buffing*

Although Fulforth,[102] Pinner[195] and others advocate the elimination of abrasive polishing when it is practicable, a different stand is taken on buffing discussion.[195] Since buffing is usually a more refined polishing, there would appear to be a contradiction here as long as the absence of a flowed layer and the continuation of the grain structure of the basis metal into the electroplate is made the prime consideration. However, Pinner is consistent since he is concerned largely with securing a surface with smooth contours and free from splinters.

6. Mechanism of Deposition and Structure of Electrodeposit

(a) *Introduction*

If one excepts the splinters to which Pinner[196] has drawn attention, the irregularities in a polished and buffed steel surface are usually quite small (5 to 20 micro-inches rms) compared to the thickness of a commercial nickel plate ordinarily used for corrosion protection (1000 micro-inches). Therefore, if the stresses, strains and irregularities in the basis steel are to affect the quality of electrodeposited nickel, they must do so by influencing the structure of the electrodeposit adversely in some way and this influence must persist for some distance into the electrodeposit, if not right up to the surface. Consequently, investigations dealing with the deposition mechanism and possible influences of the basis metal characteristics on the structure of an electrodeposit are of vital interest. Over forty references in our bibliography refer to some aspect of this subject.

Possibly the most fundamental approach to a problem closely related to this project was that of Evans and Shome[189] who studied the discontinuities in electrodeposits and their relation to the properties of the basis metal. It is unfortunate that this investigation was discontinued (Gardam,[198] Paper I). Some very careful investigation had led to the tentative conclusion that only the surface contour of the basis metal could be held responsible for the concentration of pores in the deposit at certain points. The literature is extensive and to some extent confusing. Nevertheless there appears to be foundation for the belief that the microgeometry of the basis metal surface may have a more profound effect on the structure and properties of an electrodeposit than

strains, stresses, high energy content, and other properties of the basis metal surface.

(b) *Mechanism of Deposition*

There appears to be a close analogy between the growth of an electrodeposit and the growth of crystals from a solution. There is a competition between a tendency to build on crystal faces and nuclei already in existence and a tendency to start new crystal nuclei. With low current density and consequently low cathode polarization, the tendency to produce nuclei is low and growth occurs largely on nuclei and crystal faces already present (e.g., Shrier and Smith.[107]) Under these conditions, one would expect that the deposit would be influenced materially by the structure of the basis metal. For example, Evans and Shome[102] found that the grain boundaries were favored areas for deposition under these conditions. At higher current densities, nucleus formation is encouraged and bath conditions rather than the basis metal tend to determine the character of the deposit.

Assuming that deposition on a grain in the surface of the basis metal starts at certain favored points, such as dislocations in the crystal structure, there will also be a competition between the rate of growth from such dislocations perpendicular to and parallel to the surface of the grain, commonly called the rates of vertical and lateral growth. If the rate of lateral growth is high, better coverage and a less porous deposit is expected.

In general, the corrosion resistance of a nickel deposit is a function of its thickness. This is attributed to a gradual sealing over of pores present in the initially deposited layers. Consequently, the relation of the basis metal properties to porosity has been given serious study.

Probably the most extensive studies of the relation of porosity of electrodeposit to basis metal properties have been made by Hothersall and Hammond[103] and Evans and Shome.[101,102] In both these investigations very thin nickel coatings were used so as to intensify the effect of the basis metal surface. Hothersall and Hammond succeeded in producing nonporous, thin deposits of nickel on steel (<0.0001 in) by using a specially prepared electrolytic iron as cathode, a filtered solution and platinum anodes in alundum thimbles in an effort to avoid particulate matter in the bath. Other laboratories have also shown that this is possible. However, it is questionable whether filtering the plating solutions as described would produce a dust-free liquid in the sense that this term is used by people working on light-scattering and more research in this field is indicated.

Hothersall and Hammond concluded that the porosity of thin nickel deposits was due to failure of the deposit to cover the basis metal surface completely. Such failure was due to the presence of non- or poorly conducting areas on the basis metal surface or of crevices which were not covered because of the poor microthrowing power of the bath. Evans and Shome, after rather intensive study, could not relate the localized occurrence of pores in thin electrodeposits to any factor other than the microgeometry of the basis metal surface.

There are many investigations of the porosity of electrodeposited coatings in the literature and the fact that commercial nickel plating normally fails on outdoor exposure by a pitting mode of corrosion attack is commonly attributed to porosity, either of the gross type described above or of a more diffuse type called "intrinsic porosity". The latter was considered to be an inevitable accompaniment of all electrodeposition by Thon[177] who made an extensive investigation of intrinsic porosity under Project No. 6 of the AES. An air-flow method of measuring the permeability of thin electrodeposited foils was developed and the factors influencing this permeability were studied. It was concluded that the permeability of thin foils was related to the rate of corrosion of thicker, impermeable coatings deposited under the same conditions. Although the concept of an "intrinsic" permeability may not be accepted, nevertheless Thon and his assistants did measure some property of an electrodeposit and showed that the submicroscopic permeability was higher for thin microdeposits on mechanically polished surfaces than for similar deposits on electropolished surfaces. This, combined with his conclusion that submicroscopic permeability was correlated with corrosive attack emphasized the importance of the basis metal surface.

However, a pitting type of corrosion is not restricted to electrodeposited metals but is frequently encountered in corrosion studies of rolled and cast metals. Also, there appears to be no direct evidence that pores, as such, occur in deposits of commercial thickness (about 0.001 in) except at widely scattered points. The presence of numerous pores has been inferred from the fact that numerous pits were formed under corrosive attack. It is possible that corrosion occurs at certain points only, due to some fault line or other structural defect in the electrodeposit which is not a pore in the ordinary sense. Such faults or discontinuities may tend to go anodic to the remainder of the surface, thus concentrating the corrosive attack at these points and protecting the surrounding areas.

In the corrosion of rolled or cast metals, the occurrence of pitting can usually be ascribed to the presence of a protective layer of corrosion products which is not complete and therefore leads to concentrated attack at certain points. This explanation does not appear to explain the pitting of electrodeposits in general.

If, as many authors claim, the microgeometry of the basis metal can determine the points of corrosive attack of a commercial electrodeposited coating, then some mechanism whereby an irregularity in the basis metal surface is propagated as a structural defect through an electrodeposited coating must be postulated. It is for this reason that studies on the mechanism of deposition and the structure of electrodeposits are of interest.

The mechanism of electrodeposition has received relatively little fundamental study in comparison with the mechanisms of such phenomena as adsorption, crystal growth of metal crystals from melts, crystal growth from solution, etc. It is assumed that positively charged metal ions invariably complexed with at least some water molecules approach the cathode surface individually where they are met by electrons from the external circuit and are built into a growing metal lattice. Possibly they do a certain amount of wandering about on the surface before taking up their final positions. This permits the lattice of the basis metal crystal on which they are depositing to exert an effect. Studies with single crystals as cathode show that below a critical current density continuation of the lattice of the basis metal will occur. With dissimilar metals, the electrodeposited lattice will be oriented so as to match the lattice constants of the basis crystal as closely as possible. About 15 per cent difference in lattice constants appears to be the limit.

(c) *Structure of Electrodeposits*

It is necessary to distinguish between grain structure and true crystal size and preferred orientation. The last is often referred to merely as "orientation". Many metallographic studies have shown cases in which there is a continuation of a polycrystalline grain structure from the basis metal into the deposit. This may be only a continuation of the grain boundaries. In the Evans and Shome studies[101,102] the grain boundaries were found to provide favored sites for electrodeposition. Their continuation into the deposit might be expected under such conditions. Electron diffraction studies of Finch and Williams showed that despite a metallographic appearance of continuation of structure the true crystal size and (preferred) orientation gradually depart from that of the substrate.

The continuation of the lattice of a basis single crystal may persist for 80 micro-inches or more depending on the current density. Eventually, the crystal orientation and grain structure of the deposit is governed by the bath conditions.

X-ray and electron diffraction studies indicate that the growth of an electrodeposited layer when free to assume its own texture and orientation consists in the parallel growth of a number of crystals side by side much like the growth of a metal from a melt. The possible propagation of faults through an electrodeposit

from irregularities in the microgeometry, inclusions, etc., in the surface has not been studied intensively. Presumably, if there is a sharp edge or angle formed on the basis metal surface, crystals growing at right angles to the microsurfaces would not be growing parallel to each other and there would be fault lines along which crystals from different microsurfaces would meet. This aspect of the effect of the basis metal is one which deserves further study at the present time.

For a review of the structure of electrodeposited coatings the reader is referred to Raether[10b] and to Barrett, Structure of Metals, p. 513.

REFERENCES

(Continued from last month)

[76]W. A. Wood, "The Examination of Electrodeposited Nickel Coatings by X-ray Diffraction," Phil. Mag., **20**, 964 (1935); Chem. Abs., **30**, 1279 (1936).

[77]W. Blum, P. W. C. Strausser and A. Brenner, "Corrosion-Protective Value of Electrodeposited Zinc and Cadmium Coatings on Steel," J. Research, Nat. Bur. Standards, **16**, 185 (1936); Chem. Abs., **30**, 3764 (1936).

[78]W. Cochrane, "Structure of Some Metallic Deposits on a Copper Single Crystal as Determined by Electron Diffraction," Proc. Phys. Soc. (London) **48**, 723 (1936); Chem. Abs., **30**, 7946 (1936).

[79]S. Dobiński, "Oxide Layer on a Polished Copper Surface," Nature, **138**, 31 (1936); Chem. Abs., **30**, 6636 (1936).

[80]O. Erbacher, "Effect of the Pretreatment of Metal Surfaces Upon Electrochemical Coatings," Z. physik. Chem. A, **176**, 43 (1936); Chem. Abs., **31**, 1936 (1937).

[81]G. I. Finch and A. G. Quarrell, "The Beilby Layer," Nature, **137**, 516 (1936).

[82]G. I. Finch and C. H. Sun, "An Electro-Diffraction Study of the Structure of Electrodeposited Metals," Trans. Faraday Soc., **32**, 852 (1936); Chem. Abs., **30**, 8034 (1936).

[83]L. H. Germer, "Diffuse Rings Produced by Electron Scattering," Phys. Rev., **49**, 163 (1936); Chem. Abs., **30**, 2097 (1936).

[84]Jacquet, P. A., "Electrolytic Polishing of Copper, Lead, Tin and Their Alloys and Its Application to Metallography," Bull. soc. chim. 5, **3**, 705 (1936); Chem. Abs., **30**, 4407 (1936).

[85]P. A. Jacquet, "On the Anodic Behaviour of Copper in Aqueous Solutions of Orthophosphoric Acid," Trans. Electrochem. Soc., **69**, 651 (1936); Chem. Abs., **30**, 391 (1936).

[86]H. Lowery, H. Wilkinson and D. Smare, "Discussion," Trans. Electrochem. Soc., **69**, 651 (1936).

[87]W. R. Meyer, Proc. Am. Electroplaters' Soc., 1936, p. 123.

[88]W. M. Phillips, "Effect of Polishing on Corrosion Resistance," Proc. Am. Electroplaters' Soc., **24**, 249 (1936).

[89]F. P. Bowden and T. P. Hughes, "Physical Properties of Surfaces. IV. Polishing, Surface Flow and the Formation of the Beilby Layer," Proc. Roy. Soc. (London) A, **160**, 575 (1937); Chem. Abs., **32**, 3681 (1938).

[90]U. R. Evans, "Metallic Corrosion, Passivity and Protection," London, E. Arnold and Company (1937); Chem. Abs., **31**, 3438 (1937).

[91]G. I. Finch, "The Nature of Polish," Trans. Faraday Soc., **33**, 425 (1937); Chem. Abs., **31**, 3756 (1937).

[92]G. I. Finch and A. L. Wilman, "The Structure of Electrodeposited Nickel," Trans. Faraday Soc., **33**, 564 (1937); Chem. Abs., **31**, 8387 (1937).

[93]G. I. Finch and H. Wilman, "Study of Surface Structure by Electron Diffraction," Erg. exakt. Naturw. **16**, 353 (1937); Chem. Abs., **32**, 420 (1938).

[94]G. E. Gardam, "Method of Obtaining Adherent Electrodeposits on Chromium and Stainless Steel," First Internat. Electrodep. Conf. 1937, 8 pp.; Chem. Abs., **31**, 7768 (1937).

[95]A. W. Hothersall, "The Adhesion of Electrodeposited Nickel to Nickel," First Internat. Electrodep. Conf. 1937, 8 pp.; Chem. Abs., **31**, 7767 (1937).

[96]P. A. Jacquet, "Comparative Properties of Metallic Surfaces Polished Mechanically and Electrolytically," First Internat. Electrodep. Conf. 1937, 11 pp.; Chem. Abs., **31**, 7812 (1937).

[97]P. A. Jacquet, "Structure of Thin Coatings of Copper Electrodeposited on Crystalline Copper," First Internat. Electrodep. Conf. 1937, 15 pp.; Chem. Abs., **31**, 7768 (1937).

[98]M. v. Laue, "Identification of Submicroscopic Crystal Faces by Electron Diffraction," Ann. Physik., **29**, 231 (1937); Chem. Abs., **31**, 5669 (1937).

[99]W. R. Meyer, "The Orientive Effects of the Geometrical and Crystalline Structure of the Basic Cathode on the Crystal Structure of Electrodeposits," Monthly Rev. Am. Electroplaters' Soc., **24**, 95 (1937); M. A., **IV**, 251 (1937).

[100]A. Phillips and W. R. Meyer, "The Crystal Structure of Copper Electrodeposits. Part I," First Internat. Electrodep. Conf. 1937, Paper 17.

[101]A. G. Quarrell, "Structural Changes During the Growth of Metal Films," Proc. Phys. Soc. (London), **49**, 279 (1937); Chem. Abs., **31**, 5644 (1937).

[102]F. Fulforth, "Steel for Plating Purposes," Monthly Rev. Am. Electroplaters' Soc., **25**, 25 (1938); Chem. Abs., **32**, 2435 and 3316 (1938).

[103]A. W. Hothersall and R. A. F. Hammond, "The Causes of Porosity in Electrodeposited Coatings, Especially of Nickel on Steel," Trans. Electrochem. Soc., **73**, 449 (1938); Chem. Abs., **32**, 2433 (1938).

[104]G. Menzer, "Submicroscopic Twinning," Naturwissenschaften, **26**, 385 (1938); Chem. Abs., **32**, 8871 (1938).

[105]M. Schlotter and H. Schmellenmeier, "The Influence of Surface Conditions on the Basis Metal on the Corrosion Protection of Galvanic Deposits," Z. Metallkunde, **30**, 178 (1938); Chem. Abs., **32**, 8349 (1938).

[106]R. Wagner and G. B. Hogaboom, "Discussion" after "Preparation of Electroplated Specimens for Exposure Tests," by P. W. C. Strausser, Proc. Am. Electroplaters' Soc., **26**, 18 (1938).

[107]D. Wood, "Method of Plating Nickel on Stainless Steel," Metal Ind. (N. Y.), **36**, 330 (1938); Chem. Abs., **33**, 5294 (1939).

[108]L. H. Germer, "Electron-Diffraction Studies of Thin Films. I. Structure of Very Thin Films," Phys. Rev., **56**, 58 (1939); Chem. Abs., **33**, 6701 (1939).

[109]A. W. Hothersall and G. E. Gardam, "The Structure and Properties of Bright Nickel Deposits," J. Electrodepositors' Tech. Soc., **15**, 127 (1939); Chem. Abs., **33**, 9149 (1939).

[110]A. W. Hothersall, "Notes on the Adhesion of Electrodeposited Metals to Steel," Proc. Amer. Electroplaters' Soc., **27**, 1 (1939); Chem. Abs., **34**, 1918 (1940).

[111]B. F. Bower, "Polishing and Buffing Semi-automatically," Metal Ind. (N. Y.), **37**, 71 (1939); Chem. Abs., **33**, 3311 (1939).

[112]W. Blum and P. W. C. Strausser, "Outdoor Exposure Tests of Electroplated Nickel and Chromium Coatings on Steel and Nonferrous Metals," J. Research, Nat. Bur. Standards, **24**, 443 (1940); Chem. Abs., **34**, 5761 (1940).

[113]B. F. Lewis, "The Relationship of Cleaning Techniques and Adhesion of Electrodeposits," Proc. Amer. Electroplaters' Soc., **28**, 64 (1940); Chem. Abs., **34**, 6172 (1940).

[114]W. L. Pinner, "The Effect of Basis-Metal Polishing on the Character of Nickel Plate," Proc. Am. Electroplaters' Soc., **28**, 137 (1940); Chem. Abs., **34**, 6529 (1940).

[115]H. R. Thirsk, "The Structure of Metal Films," J. Roy. Coll. Sci., **10**, 35 (1940); Chem. Abs., **34**, 5715 (1940).

[116]V. I. Arkharov and Z. P. Kichigina, "Influence of the Composition of the Cathode on the Structure of Electrolytic Chromium," J. Applied Chem. (USSR), **14**, 79 (in German, 80) (1941); Chem. Abs., **36**, 970 (1942).

[117]W. Blum, A. O. Beckman and W. R. Meyer, "General Principles and Methods of Electroplating," Trans. Electrochem. Soc., **80**, 294 (1941); Chem. Abs., **35**, 7291 (1941).

[118]G. Dubpernell, "Chromium Plating," Trans. Electrochem. Soc., **80**, 589 (1941); Chem. Abs., **35**, 7293 (1941).

[119]C. L. Faust, "Discussion" after "Nickel Plating" by W. L. Pinner, G. Soderberg and E. M. Baker, Trans. Electrochem. Soc., **80**, 575 (1941).

[120]J. Fischer, "Progress in the Field of Hard-Chromium Plating," Korrosion und Metallschutz, **17**, 265 (1941); Chem. Abs., **36**, 5096 (1942).

[121]K. Gebauer, "Hard-Chromium Plating on Aluminium and Alloys," Korrosion und Metallschutz, **17**, 276 (1941); Chem. Abs., **36**, 5096 (1942).

[122]G. A. Lux, "Polishing Steel Specimens Prior to Plating for Exposure Tests," Proc. Am. Electroplaters' Soc., **29**, 54 (1941); Chem. Abs., **36**, 348 (1942).

[123]W. L. Pinner, G. Soderberg and E. M. Baker, "Nickel Plating," Trans. Electrochem. Soc., **80**, 539 (1941).

[124]R. Piontelli and G. Poli, "The Effect of the Basis Metal on the Deposition of Other Metals Upon It," Rend. ist. lombardo sci, Classe sci. mat. nat., **75**, 453 (1941–42); Chem. Zent., 1943, I, 2671; Chem. Abs., **38**, 4870 (1944).

[125]R. P. Rogers, "Preparing Metal Surfaces for Electroplating," Canadian Chem., **25**, (1), 7 (1941); M. A., **14**, 389 (1947).

[126]Toledo Branch, AES, "The Relative Effect of Various Polishing Finishes on Corrosion Resistance of Electroplated Nickel Deposits on Steel," Proc. Am. Electroplaters' Soc., **28**, 144 (1940).

[127]K. Gebauer and K. Sommer, "Smoothness of Hard Chromium Deposits as Influenced by Roughness of Basis Metal," Tech. Zentr. Prakt. Metallbearbeit **52**, 17 and 40 (1942); Chem. Abs., **37**, 4306 (1943).

[128]A. W. Logozzo, "Preparation of Surfaces for Hard Chromium Plating," Proc. Am. Electroplaters' Soc., **30**, 33 (1942); Metal Finishing, **41**, 15 (1943); Chem. Abs., **37**, 567 (1943);Chem. Abs., **37**, 1087 (1943).

[129]G. A. Lux and M. Berdick, "Effect of Polishing Base Metals Upon the Protective Value of Electroplated Coatings," Proc. Am. Electroplaters' Soc., **30**, 19 (1942); Chem. Abs., **37**, 567 (1943).

[130]F. K. Savage and P. B. Pfefferle, "Progress Report of the Study of Anode and Cathode Phenomena Shown by Color Photography," Proc. Am. Electroplaters' Soc., **30**, 39 (1942); Chem. Am., **37**, 1936 (1942).

[131]W. A. Wesley and E. J. Roehl, "The Electrodeposition of Hard Nickel," Trans. Electrochemical Soc., **82**, 37 (1942); Chem. Abs., **36**, 3435 (1942).

[132]W. Hume Rothery and M. R. J. Wyllie, "The Structure of Electrodeposited Chromium," Proc. Roy. Soc. (London) A, **181**, 331 (1943); Chem. Abs., **37**, 6194 (1943).

[133]M. Kolodney, "Chromium Plating," Nat. Research Council, War Metallurgy Com., Nat. Acad. Sci., Information Release No. 4 (1943); Chem. Abs., **38**, 3551 (1944).

[134]G. L. Clark, G. Pish and L. E. Weeg, "Bonding and Structural Variations of Commercial Electroplates 2 to 55 x 10^{-6} inch thick," J. Applied Phys. **15**, 193 (1944); Chem. Abs., **38**, 1959 (1944).

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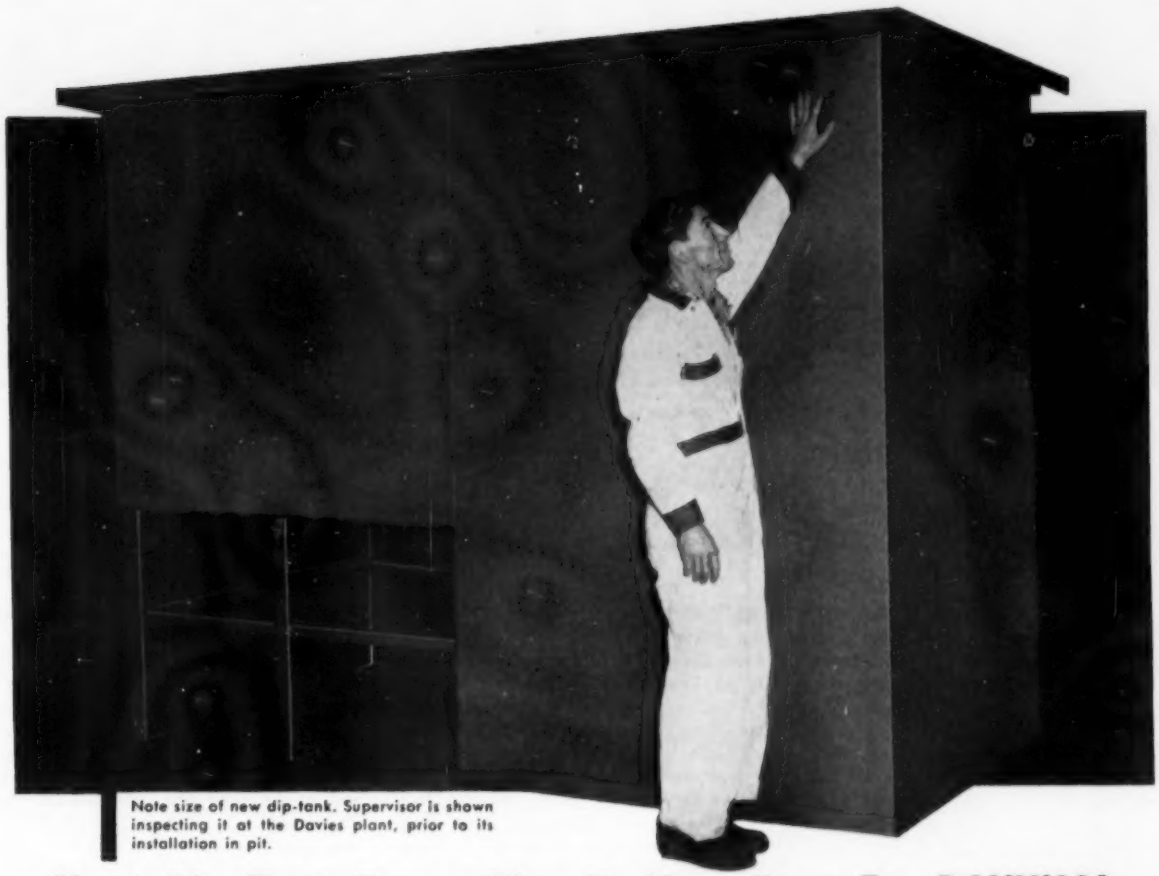

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Representatives of Exposition Committee and American Electroplaters' Society in joint planning session

Exposition and Convention Committee had representatives for a joint meeting. Papers discussed

CLEVELAND CALLING!

Final plans are shaping up fast as the result of many meetings and much activity of the Convention Committee of the American Electroplaters' Society. Eugene L. Combs, General Chairman of the Convention Committee, in a recent statement said, "I am pleased with the many activities which have been planned and now that the list of titles for the papers to be delivered at the 42nd Annual Convention of the American Electroplaters' Society has been prepared, I am convinced more than ever that the show in Cleveland on June 20th through the 23rd will be the most constructive and informative show that we have ever seen."

Tentative titles of papers to be delivered at the Convention are: "Liquid Level Control," "Recovery of Waste Cyanide Zinc," "Plating Powdered Metallurgy Bronze Parts," "High Speed Brass Plating," "Materials of Construction for Plating Rooms," "Anodic Etch of Ferrous Parts Before Plating," "Surface Preparation," "Fatigue of Plated Steel Parts," "Job Shop Costs," "Tin Plating of Copper Wire," "Nickel and Copper Plating on Coils," "Copper Plating on Steel for Telephone Drop Wires," "Effect of Ripple on Plating," "Filtering and Handling of Chromic Acid Solutions," "Handling of Waste and Waste Treatment," "Finishing and Plating of Beryllium and Beryllium Alloy," "Vacuum Metallizing," "Anode Current on Phosphatized Copper Anodes," "Flow Coating of Paint."

According to the Convention Committee, Convention goers will be repaid many times because of the newness of ideas and tremendous changes and advancements in the industrial finishing industry which will be seen. There have been many important advancements and there is a great need for knowledge and information about new manufacturing processes, machinery and improved methods in the science of industrial finishing, said Mr. Combs. Some of the most important developments have been introduced during the past few years, which means that these ideas and manufacturing processes will be discussed and exhibited for the first time in Cleveland at the 1955 Industrial Finishing Exposition and 42nd Annual Convention of the American Electroplaters' Society.

The American Electroplaters' Society officers have indicated that the many new ideas in industrial finishing all add up to making it possible to produce better finished products at a lower cost to the industry. Because of ever-increasing competition, any industry, even those remotely connected with the finishing industry, will be vitally interested in subjects of that nature.

The last show was held in Chicago in 1952. That means the show in June 1955 provides the first opportunity in 3 years for firms engaged in the plating industry to see first-hand many new processes and developments which now influence their businesses.

On January 27, in an afternoon session, the Exposition Committee delivered a program report which was submitted to the Executive Board of the American Electroplaters' Society. The report was delivered at a special meeting on January 30. After the report was submitted, members of both the Exposition Committee and the Convention Committee met at a joint meeting to discuss the papers which are being planned for delivery of the 42nd Annual Convention of the American Electroplaters' Society. All members were enthusiastic about the wide scope of subjects which are being presented.

Alpine Village Committee (left to right): Marie Hoefer, Lucille Schaefer, Mary Combs, Chairman; Eleanor Renton. Absent—Meta Pochapsky

Plato Committee (seated, left to right): Adelaide Ott, Marcella Oberg, Rita Shepard, Chairman. (Standing, left to right): Margaret Piovarey, Louise Malejan, Louise Pavlish, and Margaret Schaefer

Officers (1st row, left to right): Rita Shepard, Vice-President; Frances Hoffman, President; Gwin King, Corresponding Recorder. (2nd row, left to right): Ann Platt, Treasurer; and Ann Pavlish, Corresponding Secretary

Because many convention visitors plan to bring their wives, officers of the Convention Committee were especially interested in women's activities. The officers of the Committee in charge of women's activities have been busy making plans, too, and have mapped out plans which will send the ladies home with enough material for conversation for years. Frances Hoffman, President of the Ladies' Activities Committee, set a goal of making the 1955 Convention the most interesting, educational and entertaining ever. According to Committee reports, the ladies will be kept very busy with interesting side trips, luncheons and many other events. The Plato Party Committee, headed by Rita Shepard, promises the most interesting party of all time. Rita Shepard said, "Any ladies who miss the Plato Party this year will be sorry."

The Hospitality Committee, under the chairmanship of Dorothy Allen, is making special plans to make sure that all the ladies are properly welcomed and that folks will have whatever guidance is needed to take in all of the many events with as much of the "make-yourself-feel-at-home" spirit as possible. Congeniality should be at a new high with the plans contemplated by the hospitality committee.

Wives attending the June convention in Cleveland will have something to tell the folks at home about after they see what the Alpine Village Committee has planned for them. The Alpine Village Committee, under the chairmanship of Mary Combs, promises an especially wonderful luncheon at Cleveland's famous Alpine Village.

The Committee for Aunt Ella's Party, under the chairmanship of Ann Pavlish, will make its own strong bid to send fond memories home with the ladies who attend the convention.

Among the many events being planned is a very interesting tour of one of Cleveland's newest and most modern suburban shopping centers. Transportation will be arranged by the committee. Westgate is a city in itself, complete with two department stores, restaurant and some of the finest shopping facilities in the Midwest.

Westgate Tour Committee (Seated, left to right): Eleanor Bartrug, and Ann Platt, Chairman. (Standing, left to right): Charlotte Sedusky, Gertrude Lowe. Absent—Dorothea Skelly, Irma Wheeler

Aunt Ella's Party Committee (left to right): Veronica Zinni, Ann Pavlish, Chairman, Alice Baker. Absent—Germaine Lupien, Ann Hull, Judy Bondra

Hospitality Committee (1st row, left to right): Anne Boguski, Dorothy Allen, Chairman, and Gwin King. (2nd row, left to right): Dorothy Sztul, Irene Solla. Absent—Caroline Baker

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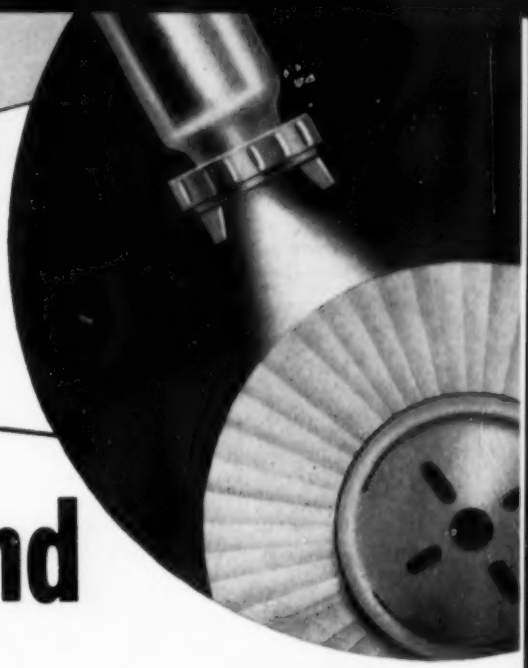

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Article References

Listed below is a compendium of articles of more than passing interest which have appeared recently in U. S. technical and trade magazines. The reader may obtain complete tear sheets of most of these articles by circling the appropriate numbers on the Reader's Service Card.

Dr. Samuel Heiman

DR. SAMUEL HEIMAN
AES Second Vice-President

1. ALLOY PLATING

a. **"A New Solderable Zinc Alloy Plating Process"**
E. B. Saubestre and E. R. Bowerman
(The Sylvania Technologist) Vol. 8, No. 1, Jan. 1955, p. 3

b. **"High Speed Brass Plating"**
T. Z. Voyda
(Metal Finishing) Vol. 52, No. 12, Dec. 1954, p. 56

c. **"Tin-Nickel Alloy Plating. A New Decorative and Protective Coating"**
(Automobile Engineers), Vol. 44, Aug. 1954, p. 320

2. ALUMINUM FINISHES

a. **"Finishes for Aluminum"**
R. Vanden Berg
(Screw Machine Engineer) Part I. Mechanical Finishing, Vol. 15, July 1954, p. 37. Part II. Chemical and Electrochemical Finishing, Vol. 15, Aug. 1954, p. 41.

b. **"Determination of Barrier Layer Thickness of Anodic Oxide Coatings"**
M. S. Hunter and P. Fowle
(Journal of the Electrochemical Society) Vol. 101, Sept. 1954, p. 481

c. **"Mechanical Properties of Aluminum Hard Coatings"**
H. A. Johnson
(Product Engineering) Vol. 25, Sept. 1954, p. 136

3. CLEANING AND PICKLING

a. **"How to Select Abrasives for Blast Cleaning"**
V. F. Stine
(Precision Metal Molding) Vol. 13, No. 1, Jan. 1955, p. 55

b. **"Electrolytic Descaling—An Electrical Method of Rust Removal from Tanker Ship Compartments"**
F. E. Cook, H. S. Preiser and J. F. Mills
(Journal of the American Society of Naval Engineers, Inc.) Vol. 66, No. 4, Nov. 1954, p. 1005

c. **"How to Clean Titanium Sheet for Spot Welding"**
E. R. Funk
(Modern Metals) Vol. 10, May 1954, p. 70

d. **"The Blast Cleaning of Metal Surfaces"**
V. F. Stine
(Metal Progress) Vol. 65, June 1954, p. 104

e. **"Selection of Metal Cleaning Methods"**
ASM Committee on Metal Cleaning
(Metal Progress) Vol. 66, No. 1-A, July 15, 1954, p. 131

f. **"Boeing Develops Promising Descaling Process for Titanium and Stainless Steel"**
B. Chambers
(Western Metals) Vol. 12, Sept. 1954, p. 64

4. COPPER

a. **"Modernized Facilities Plate Gravure Cylinders Better and Faster"**
J. H. Molitor
(Iron Age) Vol. 175, No. 22, Nov. 25, 1954, p. 96

b. **"The Effect of Ultrasonic Waves on the Electrodeposition of Copper"**
W. R. Wolfe, H. Chessin, E. Yeager and F. Hovorka
(Journal of the Electrochemical Society) Vol. 101, No. 12, Dec. 1954, p. 590

5. CORROSION

a. **"The Silent Enemy"**
E. A. Stockbower
(Ordnance) Vol. 34, No. 207, Nov.-Dec. 1954, p. 502

6. ELECTROFORMING

a. **"Electroforming, a Method of Producing Intricate Shapes"**
V. A. Lamb and W. H. Metzger, Jr.
(Tool Engineer) Vol. 33, Aug. 1954, p. 55

"Electroformed Gauges and Dies"
(Automobile Engineer) Vol. 44, Oct. 1954, p. 403

7. ELECTROPOLISHING

a. **"Where and When to Use Electropolishing"**
M. W. Riley
(Materials and Methods) Vol. 39, June, 1954, p. 104

b. **"Conditions for Electrolytic Polishing of Metals and Alloys"**
S. H. Bush
(Materials and Methods) Vol. 39, June 1954, p. 137

8. CHROMIUM

a. **"Hard Chrome Can Be Plated in 'Tenths'"**
G. Mirjian
(American Machinist) Vol. 98, Aug. 2, 1954, p. 101

9. PLANT LAYOUT

a. **"Westinghouse Uses Time Study to Increase Output"**
F. B. Dugan
(Products Finishing) Vol. 19, No. 2, Nov. 1954, p. 32

10. PLATING ON MAGNESIUM

a. **"Electroplating on Magnesium"**
L. D. and D. J. Goodeyne
(Light Metal Age) Vol. 11, No. 11, Dec. 1954, p. 30

11. REVIEWS

a. **"Technical Developments of 1954"**
N. Hall
(Metal Finishing)

b. **"Annual Forum of Technical Progress in Cleaning and Finishing"**
(Steel) Vol. 136, No. 1, Jan. 3, 1955

12. RINSING

a. **"Rinsing Techniques"**
J. B. Kushner
(Metal Finishing) Vol. 53, No. 1, Jan. 1955, p. 76

13. SURFACE TREATMENTS

a. **"Peroxygen Compounds Good for Metal Treating"**
P. H. Margulies
(Iron Age) Vol. 175, No. 4, Jan. 27, 1955

b. **"A Survey of Chromate Treatments"**
W. E. Pocock
(Metal Finishing) Vol. 52, No. 12, Dec. 1954, p. 48; also Vol. 53, No. 1, Jan. 1955, p. 80

14. WASTE DISPOSAL

a. **"Control of Accidental Discharge of Cyanide Solutions"**
B. A. Poole, R. H. Holtje and W. G. Belter
(Sewage and Industrial Wastes) Vol. 26, No. 11, Nov. 1954, p. 1382

b. **"Ion Exchange a Practical Tool in the Plating Room"**
R. J. Keating
(Metal Finishing) Vol. 52, No. 12, Dec. 1954, p. 52

c. **"Plating Wastes—A Review of Research"**
D. G. Foulke and R. F. Ledford
(Metal Finishing) Vol. 53, No. 1, Jan. 1955, p. 67

15. WHISKERS

a. **"Metals with Whiskers"**
S. M. Arnold
(Bell Laboratories Record) Vol. 32, No. 11, Nov. 1954, p. 417

16. WIRE PLATING

a. **"Composite Wires by Electroplating"**
F. C. Slike
(Wire and Wire Products) Vol. 29, No. 11, Nov. 1954, p. 1324

b. **"Compact Unit Plates Heavy Ductile Coatings on Steel Wire"**
H. Kenmore
(Iron Age) Vol. 174, Nov. 11, 1954, p. 117

Mail Box

January 21, 1955

GENTLEMEN:

We read with great interest your story "Plating Racketeers Invade Industry" by A. W. Logozzo, published in the January issue of PLATING. The condition described in the article applies word for word to our industry. Numerous local plants and machine shops had the same costly and unpleasant experience with them. These racketeers here are Romany Gypsies, most obnoxious and repulsive individuals, who follow the technique outlined in your story to the last detail.

In order to protect our present and future customers, we would like to mail to them re-prints of your story. We would therefore appreciate greatly your informing us of the price of say 100 of such re-prints.

We would then mail these re-prints with an explanatory letter, warning the firms against dealing with these shady individuals.

Hoping to meet with your kind co-operation in the interest of ridding the industry of these parasites, we remain

Yours very truly,
NEO ELECTROPLATING LTD.
C. K. Zenwirt,
Hamilton, Ont.

[EDITOR'S NOTE: Reader Zenwirt has official company. This article ran in the Cincinnati Times-Star of Feb 4:

"GYPSY" REPLATERS WARNING ISSUED

"Gypsy" metal replaters and refinishers are back in the Cincinnati area, the Better Business Bureau warns.

Large and small business concerns should be on the lookout for "swarthy-looking men driving out-of-state cars and trucks," the bureau said. "They may offer to do a sample replating job on chrome, silver, gold, copper, tin and other metal articles at a reasonable price. The sample will be good work.

"Should you give them a large order, you may find that you are faced with an exorbitant bill, that you can't get the article back, or that you cannot locate the 'firm' who did the work when the defects show up."]

NEW LOOK NOTED

DEAR MR. KOVATIS:

I want to congratulate you and your staff of the nicely revised appearance of PLATING with your January, 1955 issue.

The change to the side stitching is an excellent improvement, the cover is attractive and effective.

You can all take a great deal of pride in this newly revamped product.

Kindest regards.

Cordially,

ALLAN RAY PUTNAM
Publishing Manager
The Tool Engineer
Detroit 38, Michigan

Mr. Putnam was Advertising Manager of PLATING from October 1946 to October 1949. His letter is high praise indeed! — ED.

DEAR MR. KOVATIS:

I have received PLATING for January, 1955, it's a fine edition.

Sincerely yours,

Edward W. T. Faint
Morris Plains, N.J.

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8 MICCROSOL responds to their skill and experience. Helps them give you the rugged coatings you need to protect work and your equipment.
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10 They can depend on MICCROSOL!

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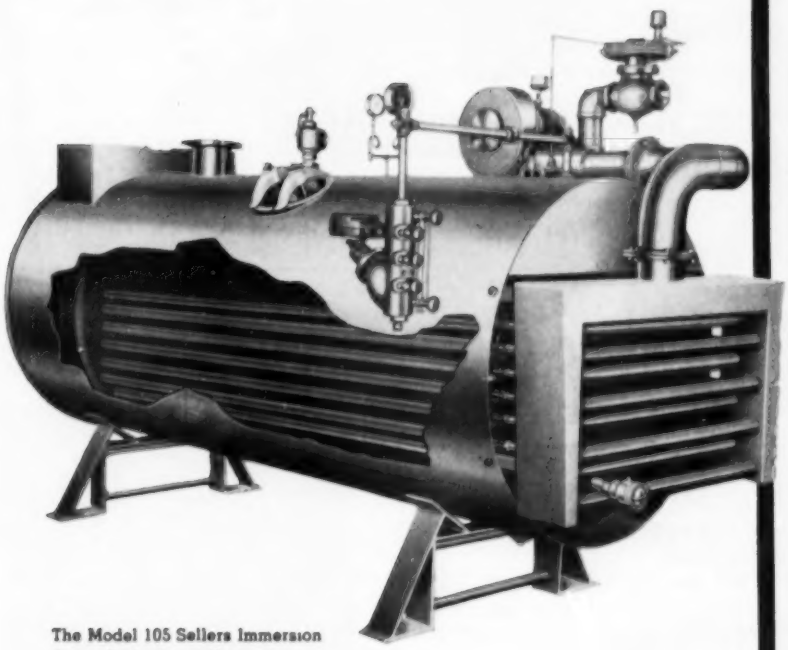

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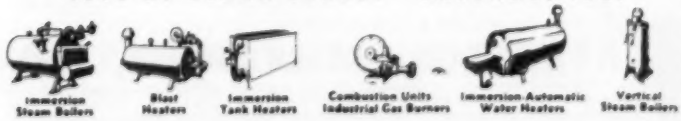

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"OLD KOSMOS"

Mail Box

February 3, 1955

DEAR PETE:

I think you fellows rang a bell throughout the automotive industry on the January issue front cover. Let us add my compliments to the many others you undoubtedly have received.

Cordially,
FORMAX MFG. CORPORATION
Howard J. McAleer*
*One of the Four Macs.

DEAR MR. KOVATIS:

. . . On this occasion I want to tell you what a great help your fine publication PLATING is for me as a practical electroplater.

During my two short visits in the U.S.A. in 1953 and 1954, maybe you remember my dropping in at AES Headquarters. I got in personal contact with a great number of American electroplaters and suppliers. I found everywhere a most courteous reception and every information and assistance I needed and frankly I am absolutely enthusiastic about all this people and their fine work.

Hoping to meet you some other time, I am

Very truly yours,
WERNER FLÜHMANN.
Zurich, Switzerland

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For pickling and metal plating you need positive protection against corrosive effect of acids on your equipment . . . and the contamination of solutions used in your operations. Linings of thick, non-porous layers of rubber, rather than a mere film or coating, offer the kind of lasting protection that lengthens the service life of your tanks and other process equipment. Rubber tank linings should be compounded to withstand changes in temperature and present a resilient, non-breakable surface at all times.

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Whether your lining problem is simple or complex, Manhattan Rubber Linings assure you lasting protection against deterioration of equipment and contamination of the solutions used in your operations. Manhattan Rubber Linings are made from thick, calendered sheets of natural or synthetic rubber . . . compounded to expand and contract with the metal without cracking and eliminate stray plating currents. Tests prove they cannot be separated from the metal without breaking. To make certain your equipment has perfect bonded protection, every Manhattan Lined Tank is tested under high voltage to detect any possible imperfections. Let an R/M lining engineer show you why Manhattan Rubber Linings are the best you can get . . . contact the R/M rubber lining facilities nearest your plant. RM 524

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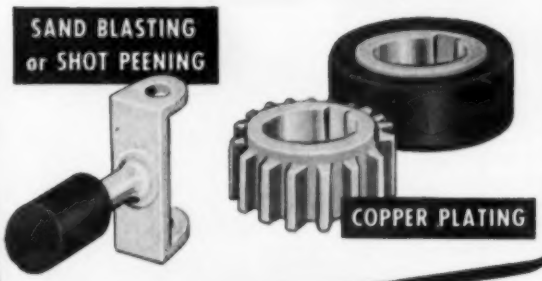

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AES News

Candidates For National Third-Vice President

RALPH D. WYSONG

Personal—Name, **Ralph D. Wysong;** age, 54; residence, 3511 Chevy Chase, South Bend, Ind.

Employer—Studebaker Division, Studebaker-Packard Division.

Position—Chemical Engineer in charge of Finishes.

Education—Graduate in Chemical Engineering. Purdue University, 1923; Registered Professional Engineer (Ind.).

AES Activities—Past President St. Joseph Valley Branch, after working his way up through all the offices; Branch Delegate to all National Conventions since 1943; Member of the Planning Committee for the 1952 Chicago Convention; Chairman of one session of the Chicago Convention; Mrs. Wysong served on the Ladies' Entertainment Committee during the 1952 Convention.

Technical Societies—(1) Member and Past Chairman of the Notre Dame Chapter American Society for Metals and on the Executive Committee for eight years; (2) Member and on the Advisory Board of the Industrial Waste and Water Resources Committee of the Automotive Manufacturers Association; (3) Member of the American Society for Testing Materials Committee B-8 on Electro Deposited Metallic Coatings; (4) Member of the American Society for Testing Materials Committee B-12 on Industrial Cleaning; (5) Member of Society of Automotive Engineers (SAE) Sub-Committee on Upholstering Materials.

Note—The Studebaker Division has granted their permission for Mr. Wysong's candidacy and will grant him the necessary time for Society activities as a National Officer.

HERBERTH E. HEAD

Personal—Name, **Herberth E. Head;** born in Owensboro, Kentucky— April 28, 1901; age, 53; residence, 5547 Fairview Avenue, Detroit 13, Michigan.

Employer—Automotive Body Division, Chrysler Corporation, Supervisor of Electroplating and Related Operations.

Education—Graduate of St. Frances Academy, Owensboro, Kentucky.

AES Activities—Past President, Detroit Branch; Delegate to National Convention for past 15 years; served on Committee handling all Industrial Finishing Expositions.

Technical Societies—(1) American Society for Testing Materials Committee B-8 on Electrodeposition; (2) Society of Automotive Engineers; (3) Electro-Chemical Society; (4) Engineering Society of Detroit; (5) Sea Horse Institute (Corrosion); (6) American Electroplaters' Society.

Note—Chrysler Corporation has approved the candidacy of Herb Head.

AES News

Research Committee Meets and Talks and Plans and Works and Accomplishes in Chicago

Dr. Serfass quietly, almost unobtrusively, rapped for order at ten in the morning. The AES Research Committee was in session. It was nearly six in the evening of the same day when the chair entertained a motion for adjournment. And thus, in eight tightly packed hours of continuous deliberation the eight members of the Research Committee had covered an amazing agenda of items ranging from corrections in the minutes of the last meeting to the disposition of large amounts of money for future research projects.

Present at this meeting in addition to the eight members of the committee were President Schaefer, Executive Board members Eddy and Kelly, Executive Secretary Kovatis and PLATING editor Doria. (See PLATING Staff Photo on this page.)

From Kovatis' lengthy report of the meeting a few items are chosen to be carried here.

(1) Racine reported that an effort is being made to develop branch research chairman responsibility. He cited the need for more meaningful function of this phase of branch activity. Racine pointed out that branches should be given more direction and a goal to tie in with sustaining membership effort.

(2) Chairman Serfass, editor of "Process Control Handbook," advised that work on the handbook, is progressing.

(3) The Committee voted to accept two proposals for the study of microthrowing power: Bochris' of the U. of Penna., and Leidheiser's of the Virginia Institute for Scientific Research.

(4) C. Sample reported that ASTM B-8 has recognized the desirability of an instrument or method to measure brightness. He suggested that a research project be proposed by the AES.

(5) AES vice-president C. Kelly reported that many requests have been received for a project on buffing and polishing. L. Borchert volunteered to take on the task of investigating the feasibility of such a project and report to the next meeting.

Plating Staff Photo

The Research Committee and guests in session. (L. to r.): DuRose, Wrisberg, Racine, Gilbert, Bowerman, Kovatis, Serfass, Borchert, Sample, Parker, Diggin, Kelly

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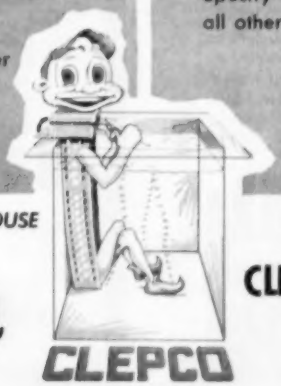
Specify CLEPCO Steel Heaters for all other alkaline tanks.

All leading Plating Supply Houses can furnish from stock.



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AES News

(6) L. Borchert agreed to look into the matter of a proposed project on mechanism of bright metal plating and report to the next meeting.

(7) M. Diggin reported that he had sent out a letter soliciting opinions on a project to deal with "Insoluble Anodes in Plating." He said that he had received 31 replies, of which 28 favored such a project. He then suggested a definition of the project and pointed out that such an undertaking would be practicable at the undergraduate level or at a commercial laboratory. Diggin stated that it would be an important contribution to AES research and to our national defense efforts.

(8) On a motion by R. Racine the Committee voted that the exposition booth be a joint effort of the Society, Plating, and Research at Cleveland.

And so on and so on and so on. These few items of the work of the Research Committee should serve to give the flavor of the work accomplished at Chicago. Here were met a group of earnest men who know what they are doing, how it should be done and by whom. This group is the motivating and directing force behind one of the most effective activities of the AES.

Plating Staff Photo

At the Executive Board Meeting in Chicago, January 30. (L. to r.): Dr. S. Heiman, 2nd Vice-President; P. Peter Kovatis, Executive Secretary; Dr. R. Schaefer, President; C. Kelly, 1st Vice-President; and F. Eddy, 3rd Vice-President

Plating Staff Photo

Herb Head (left) greets Clyde Kelly, Edna Rohrabaugh and a friend at the annual meeting of the Chicago Branch, AES. Meeting was held at the Conrad Hilton Hotel in the windy city

Grand Rapids Branch Gives Incentives to Authors

The Grand Rapids branch, through their publicity chairman, Kenneth Hampel, report that the branch paper awards program has been increased. A man can "take home" as much as $350 by presenting a paper.

Their program stands now: $50 for presenting an original paper before the branch; $100 for presenting a paper at a National Convention or having one published in PLATING.

Further, the branch offers $5.00 to any member contributing to the "Tricks of the Trade" column in PLATING

The example of the Grand Rapids branch must certainly stir others to help increase the response from the enormous fund of intellect represented by the membership of AES. Authors are people and they need the stimulus and the prodding of incentive as much as any of us.

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Stanflex
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Branch News

BALTIMORE-WASHINGTON

Following the call to order by President **Benderly** the question was raised as to the desirability of holding the January meeting at some place other than the Bureau of Standards. After a brief discussion it was decided to hold it at the Bureau.

With business finished the speaker of the evening, **R. M. MacIntosh,** Supervisor of Chemical Development of Tin Research Institute, Columbus, Ohio, was introduced to the branch by Librarian **Jules Horelick.**

"Tin-nickel Alloy Plating," MacIntosh's subject for the evening, was very interesting, well illustrated with exceptionally clear slides and an admirably delivered informative talk.

BOSTON

Boston branch has named April 30 as the date for their Annual Banquet and Technical Session to take place at Boston's Hotel Statler. Feature speakers for the technical session have not as yet been announced. The banquet will feature the Statler's usual excellent prime roast beef, dancing, entertainment and door prizes.

L. J. Love,
Program and Publicity Chairman

BRIDGEPORT

The regular business meeting and educational session was held in the Main Ballroom of the Hotel Barnum on January 14. President **Philo Bailin** called the meeting to order. Fifty-five members and guests were present.

Dalton J. Snyder, Jr., 20 Westfair Drive, Westport, Conn., was accepted to active membership.

Christmas Dinner Dance Chairman **Bob Onkey** being absent the report of Dinner Dance was made by the secretary.

Bill Ehrenerona reported the date had been set for Olde Tymers Nite and he asked the members to come out in numbers because a good time would be had

A letter from Exhibit Chairman of National Convention at Cleveland, Ohio asking Bridgeport to select an Exposition Promotion Committee to push for more attendance and exhibitors was presented to the branch for its consideration. There being no comment the General Chairman of the convention will be so advised.

At 8:35 P.M. **Floyd Tatum,** librarian, presented the featured speaker of the evening, **Gerry Lux,** Technical Research Director of Oakite Products Inc. From the onset Lux was able to hold the interest of all members by his straightforward, lucid, down-to-earth presentation of facts

Bob Parker, *Secretary*

CINCINNATI

After a pleasant dinner, the meeting was called to order by President **Bill Gordon** at 7:30 P.M. There were 28 members and guests present.

We enjoyed a film prepared by the Argus Camera Co. on the manufacture and assembly of cameras.

Bob Rarick gave a report to the branch on the meeting of the Technical and Scientific Societies Council. This meeting concerned itself with method of making the Engineering Bulletin and Directory self-supporting. It was felt that committees could be appointed to sell and promote advertising in the Engineer & Scientist.

Qualification of applicant societies requesting membership were discussed.

Ezra Blount gave a report on the progress of the Second Tri-State Annual Dinner Dance to be held in Columbus, Ohio March 26. Ezra noted that the Dayton branch has definitely decided to participate. A committee has been activated consisting of **Herb Kennedy, Dick Jager, Bob Ruleff** and **Ezra Blount** to consider and recommend the appointment of a permanent Tri-State committee. Announcement was made of bus service available to Columbus on that date and some future contact will be made with members to see who is interested.

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Branch News

Will Loveless gave a report received from the National Educational Committee, headed by **Clyde Kelly**, urging local branches to assist members in knowledge of electroplating. This topic was discussed for some time, but not enough interest was evidenced to establish regular courses of training at this time.

It was voted on and passed that there would be no March meeting because of the conflict with the Tri-State Annual Dinner Dance.

Ezra Blount made a motion, which was passed by the membership, that two branch representatives be appointed to a Tri-State Annual Dinner Dance Committee. President **Gordon** announced that these representatives would be appointed at the next meeting.

The speaker of the evening was **Walter Helbig** of Darco Dept., Atlas Powder Company. Helbig gave us a very interesting discussion on the uses of activated carbon in industry and its application to the electroplating industry. His talk gave us knowledge as to how activated carbon is made, what it is, where it is used in industry and how it best can be applied to the purification of electroplating solutions.

We were guests of the Chipman Supply Co. at the usual Social Hour.

L. J. Howald, *Secretary*

COLUMBUS

The regular meeting was held at Battelle Memorial Institute on January 7.

A film depicting the founding and growth of the DuPont Company was presented by **Bill Neill** and assistants.

The business meeting was then called to order by President **Bill Schickner.**

Doug Gordon and **Larry Noll** reported the results of a CTC meeting to discuss plans for a proposed building for the Central Ohio Technical Foundation. Means to obtain our share of the initial $65,000.00 fund are to be discussed at a later meeting.

Librarian **Bill Neill** reported that the speaker for the February meeting will be **Dr. H. T. Yee,** engineer with the Ohio Department of Industrial Hygiene.

Dr. C. L. Faust was asked to introduce the speaker of the evening, Dr. **Bruce Gonser** of Battelle, whose subject was "Metals, Their Relative Abundance and Properties."

President **Schickner** thanked the speaker, after which the meeting was adjourned in favor of coffee and donuts prepared by **Doug Gordon** and **Jim Kitchen.**

Michael Farr, Jr.,
Secretary-Treasurer

DALLAS–FORT WORTH

The Dallas-Fort Worth branch held its regular meeting at the Lennox Hotel, Grand Prairie, Texas, on January 19. After a short business meeting, presided over by Vice-President **Kurt Kirsten,** the meeting was turned over to our guest speakers.

Jack Challacombe of Beckman Instrument Company, Houston, Texas, gave us a very interesting talk with the use of color slides on the subject, "*p*H in the Plating Room." Jack was able to give all members present the picture of *p*H measurement, the necessity for accurate measurement, and a graphic picture of the exact nature of *p*H and its measurement.

The next speaker was **L. C. "Duke" Kingsbury** of Allied Research Sales Corporation, Baltimore, Md. Duke gave us a fine talk on the subject of recent developments in chromate coatings. A review of government specifications covering finishing of nonferrous metals was also covered. The latest government tests on magnesium and its finishes were discussed.

Seventeen members and visitors were present and the application of one new member was acted upon.

R. H. Heppel

DAYTON

The regular January meeting was called to order by President **John Easton** at the Hotel Biltmore on January 19. Thirty-eight members and friends were present. Two new members were elected: **Jack D. Hoffman** of the National Cash Register Finishes Laboratories and **Glenn C. Winston** of the Moraine Products Div., GMC Plating Laboratory. We also lost a good member: **John R. Guss.** Our loss is Detroit's gain for John transferred to Detroit.

Librarian **Holle Leuchauer** introduced **Herman Austen** who presented a short color film on the research activities at the

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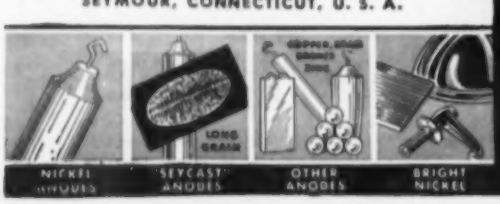

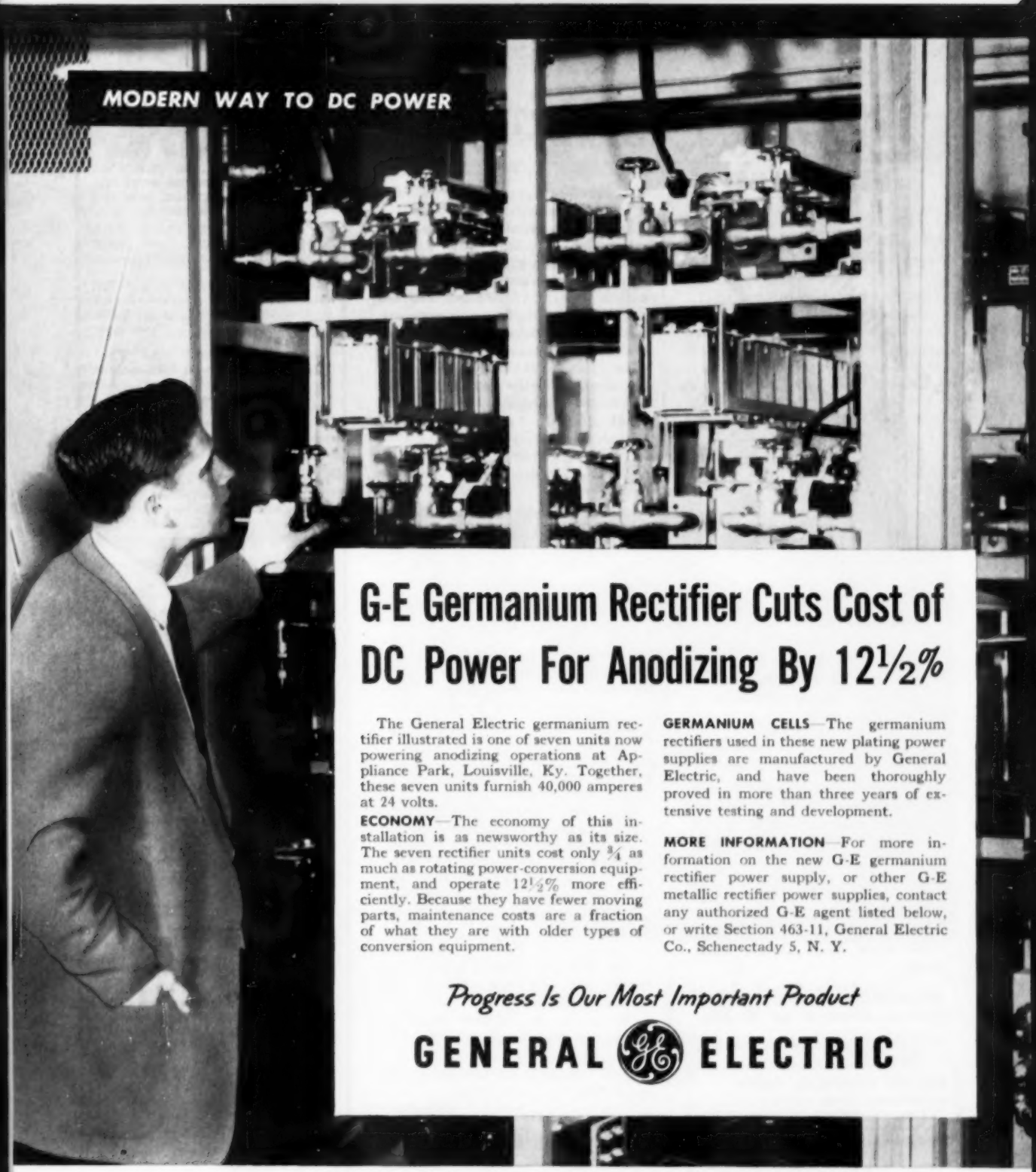

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Branch News

National Cash Register Co. It proved to be very interesting but far too short.

Leuchauer then introduced **R. W. Redmond** of Murray Way Corp., Birmingham, Mich., who gave a paper, "Metal Finishing." Redmond discussed the history of polishing, the abrasive used and then presented the story of automatic flat polishing pertaining to coil or sheet stock. Redmond was with various divisions of General Motors for 32 years and one of those directly responsible for the introduction of flat polishing. Refreshments after the meeting were served through the courtesy of the Parker Rust Proof Co. of Detroit and their local representative, Dayton member **Gustave (Gus) Wendt.**

R. M. CLINEBENS, *Secretary*

DETROIT

The January meeting was held in the Wayne Room of the Statler Hotel, January 7. The meeting was called to order at 8 P.M. by **Joe Gurksi.** A color movie, "Trout a la Shoshone," was thoroughly enjoyed by the 200 members attending.

Bob Racine introduced 17 persons nominated for membership into the society. A motion was made by **H. Head** and seconded by **J. C. Drinkwater** that they be accepted.

Fred Olmstead told his usual story and introduced **H. Kaforski,** the General Chairman of the meeting.

Dr. **R. Harr,** of Western Electric Company, Chicago, was introduced by the General Chairman. His subject for the evening was "Non-Electrolytic Chemical Treatments for the Plating Room." Dr. Harr's talk covered the history of Chromate Coatings on Zinc and Cadmium from World War I to the present time. He discussed the "Cronak" process and also the New Jersey Zinc Company's Patent No. 2,106,904, which superseded the Cronak Process.

His speech also covered Phosphate Coatings on Zinc and Oxide Coatings on Steel.

There was a short question and answer period after Dr. Harr's speech.

PATRICK J. DRISCOLL

GRAND RAPIDS

The January 14th meeting of the Grand Rapids Branch, located approximately in the center of a peninsula surrounded by more fresh water than any area on the face of the earth, was attended by approximately 50 members.

President **Carl Green** rapped the meeting to order on a new speakers' rostrum, which he had constructed for the branch.

Two new members were elected into membership: **Earle Lee Blakeslee** of the Arteraft Company and **Werner Blu-**

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Branch News

menthal of the A.M.I. Corporation. The branch offers a hearty welcome to these gentlemen.

Lyman Sperry introduced a motion to clarify the rules of our branch paper awards. At the same time, it was the consensus of opinion of the members to increase the amount of the awards. The motion was carried, so now our branch will give a member $50 for presenting an original paper before our branch and $100 for presenting a paper at a National Convention or having one published in PLATING.

A second motion proposed by Sperry gave any member $5.00 for contributing an article to the "Tricks of the Trade" column in PLATING magazine.

The Grand Rapids branch feels very proud of its paper awards program, which certainly should stimulate authors to write papers for publication. It is now possible for a member to win as high as $350 for a published paper.

Librarian **Tom Henner** introduced **Richard Landon,** Kanigen Division of the General Transportation Corporation, Chicago, who spoke on "Kanigen Electroless Nickel." Landon stated that chemical nickel can be used anywhere that electroplated nickel is used (except, perhaps, for bright decorative work at present). Electroless nickel is especially helpful to a designer as he may make his design any grotesque shape and have no worry about "throw" of the plate. It is presently being used to plate valves, pump housings, pipes, cylinders, tank cars, etc. It is very useful in building up worn tools, as no machining is necessary after plating.

The cost of electroless nickel plating is at present 3 to 6 times the cost of electroplating nickel. Therefore, platers should not throw away their anodes and generators just yet.

Because of the great interest in the subject, Landon answered a multitude of questions at the close of his very fine talk.

Tony Preston and **Bernie Julian** won the split Jack Pot for the evening. The winners are usually asked to join a "social" poker game.

KENNETH HAMPEL,
Publicity Chairman

HARTFORD

The regular branch meeting was held at the Bond Hotel on January 17 with 67 members and guests present. Preceding the meeting **Gene Dowling**, president of the Hartford branch, showed color films of places seen during his recent visit to Ireland, England and France. Accompanying the slides, Dowling presented a very interesting commentary with various historical spots that were shown.

The guest speaker for the evening was **Richard Barrett,** president of the Barrett Chemical Products Corp., whose subject was "Nickel Plating from the Sulfamate Bath."

Barrett interestingly presented the early history of plating from sulfamate baths. The competition of the nickel plating baths using sulfamate presently were discussed as were also the properties of the nickel plated from the sulfamate bath compared to the Watts bath. The use of nickel plating from sulfamate baths showed the following advantages: (1) Stress free deposits, (2) Higher current density operation at lower temperatures, (3) Easier to control, (4) Less sensitive to impurities, etc.

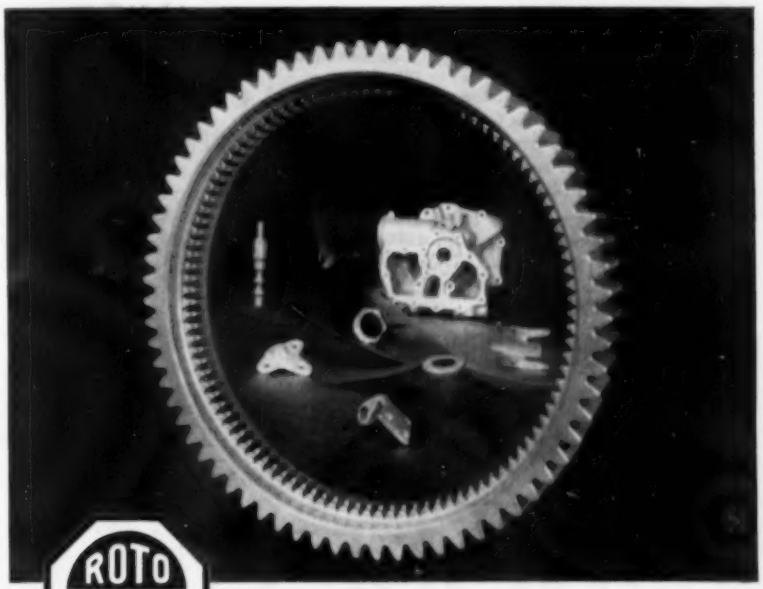
The technical chairman for the evening was **Arnold Johnson.**

STANLEY PLATOZ, *Secretary*

HOUSTON

The January meeting of the Houston branch was held at the Ben Milam Hotel on January 18 with 17 members and 7 guests present.

L. C. Kingsbury, vice-president of Allied Research Products, Inc., gave an interesting talk on chromate conversion coatings as applied to zinc, cadmium, aluminum, magnesium, silver and copper. He told of the work being done by the Federal government on the revision of specifications covering these processes.



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Branch News

Jack A. Challacombe, field engineer for Beckman Instruments, discussed *p*H control in electroplating and showed some interesting slides in this field.

INDIANAPOLIS

Despite the rainy weather of January 5, 40 members and guests attended the dinner of the Indianapolis branch. At 8:00 P.M. an addition five members came. The guests included **L. J. Howald,** secretary of the Cincinnati branch. Committee reports were by **Quentin Shockley** on annual educational and dinner-dance plans and also a report from **Les Reynolds** and **Marshall Whitehurst** on plans for an Indianapolis branch display at the Cleveland convention.

Correspondence consisted of an announcement of the Chicago annual affair on January 29th. A letter from St. Joseph Valley branch was read announcing the candidacy of **Duke Wysong** for 3rd vice-president. One of our members, **Rex Oyler,** sent in his resignation from the branch and the secretary was instructed to send regrets.

Under new business, **John Holland** announced he is to present the "Paper" at the national convention. One of our faithful members, **Tom Evans,** is in the Methodist Hospital for a check-up. The branch wishes him the best.

Herb Kennedy again reported on the Columbus, Ohio meeting of March 26th stating he hoped we all could go.

An interesting idea was brought up by **Ed Bruck** to have an organization through the national AES to investigate and place those in the plating field who are unemployed. Further information will be presented about this at a later date.

The program for the evening proved that to belong to the AES a member does not always have to be given a technical program in order to maintain his interest. **Al Huber,** chairman of the Marion County Crime Commission, was our speaker. Since this commission is fairly new, as it was organized in 1951, the group has done marvelous work cooperating with the various law enforcements of the city and county. Several points were cited as to the qualifications of a good law enforcement officer, also how he should be promoted. Various types of crimes were discussed, and what each one often leads up to. Huber stated that too many times the profit from criminal activities, particularly gambling, are used to control local government and elections. Three points were given for a citizen to follow in order to curb crime. They are: support good men running for public office, stand by and encourage these men after their election, and support vigorous but fair enforcement of our laws. A very enthusiastic half hour followed the talk when almost all present had a question to ask. As Huber stated, we're all interested in doing something about the crime in our various localities, but we're just too busy to do anything about it, or so we think. This kind of program made us all think.

Allison Division of General Motors Corporation was host to the Indianapolis branch members and guests on February 2. Seventy-one attended and were served a delicious dinner in the cafeteria. **O'Brien** of Allison was our host and cordially welcomed us. Our business meeting was suspended except for a few announcements. One was about the tri-state meeting at Columbus on March 26 and the other our own annual session on April 23.

After the dinner we were shown a film explaining what jet power is and afterwards were shown through the "Powerama" exhibit. This is a permanent exhibit of Allison products and product development. It is a place where customers, employees, neighbors and suppliers can become better acquainted with the work and products of the Allison organization. Most of the "powerama" exhibits are animated, and many of them "talk". We

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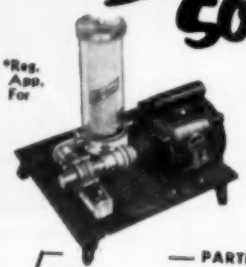
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Branch News

saw a model test stand operate, putting a miniature turbo-prop engine and propeller through tests. Across the room we pushed a lever and started a model jet plane on its flight, watched the flow of fuel, and heard an explanation of the vital importance of our fuel reserves. There were several cutaways of jet engines on display and other things Allison makes. From the ceiling hang many model airplanes which all have Allison products in them. These are controlled from a panel board. A person could spend hours in the place and still not see everything. "Powerama" stands as a permanent monument to the many Allison people who contribute their skills daily to the progress of modern industry. After eighteen months of preparation, this exhibit was opened on February 8, 1954.

The branch is indeed privileged to enjoy such hospitality from the Allison Division.

EDNA ROHRBAUGH, *Secretary*

MILWAUKEE

The 455th regular meeting was held January 7 at Ambassador Hotel and was called to order at 9:00 P.M. by President **Schwemer.** The meeting was late due to the large turnout for the speakers' dinner, given in honor of Dr. **Saltonstall** of Udylite. Guests at the meeting were introduced and they were **Larry Jores** and **Sam Antcliff,** Milwaukee Stamping Co.

The Welfare Committee reported that **Nick DiCesare** is still quite ill, and that **Neal Farmer** was also stricken ill.

E. H. McCoy of the Membership Committee made an appeal for new members. Three applicants' names were read and their names referred to the Board of Managers for approval.

A. Linn, librarian, introduced **R. Steuernagel** who gave a short speech on the research program and he also commented that sustaining members were also welcomed to the results of the research projects.

Linn introduced Dr. **Saltonstall** who spoke on "Fundamentals of Electro-Plating."

After the speech the 55 members and guests present adjourned the meeting, in favor of some refreshments.

C. PETER, *Secretary*

NEWARK

The regular monthly meeting of the Newark branch was held at 8:30 P.M. after a showing of the film by **Howard Cobb.** A total of 70 was in attendance including all officers and Editorial Board members **Bill Geissman. Dan Gray. Jack Winters** and **Ed Bowerman. James Adams,** the new PLATING production manager, was introduced. The business meeting included acceptance of membership applications from **Salvatore Fresco,** Fresco Silver Plating Co. and **Paul J. Theussen,** Metal Processing Co.; the election to membership of **Paul Topelian, Harold Kelshaw** and **David Siversten;** a report by Secretary **Wagner** that the Christmas party was a financial success; and a request that **John Banta** draw up a resolution stating the concern of the Newark branch re New Jersey water resources.

Cliff Struyk, librarian, then introduced **Ray Abazia** of the Curtiss-Wright Aeronautical Corporation, who discussed the use of electroless nickel for plating aircraft cylinders, probably the oldest commercial application of the process. The aluminum cylinders are plated individually in glass containers with 0.0005 in to 0.0007 in of nickel and heat treated to improve the hardness and ductility. The alkaline bath is used but Abazia stated that for most general work the acid bath is satisfactory.

Hubert Goldman. Enthone, Inc., was then introduced and presented an interesting paper relating adhesion of electrodeposits to the condition of the base metal prior to plating. He also described the alkaline derusting process and pointed out how under certain circumstances this method can remove metal and greatly improve adhesion by removing the amorphous layer. Normally, no metal loss occurs, however. Ordinarily, the process is operated at 25–50 asf, but can go to 700 asf and can use PR current, 7 seconds anodic to 10 seconds cathodic. The process was demonstrated by Goldman and colored slides shown of certain applications.

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Branch News

The talk was well received by those present.

P. GARDNER FOULKE,
Recording Secretary

ROCKFORD

The monthly meeting of the Rockford branch was held on January 10 at the Faust Hotel with 30 members and guests present for dinner and about 40 for the meeting which followed.

Plans were discussed for the coming Annual Educational Session and Banquet which will be held on March 19.

Lawrence Ray, who is chairman of the technical session, reported that he has received letters of confirmation from **Ezra Blount,** Editor of Products Finishing, and **Dr. Henry Brown,** Udylite Corp., who will present papers in the afternoon. A third speaker has not yet been selected.

Clyde Kelly, 1st Vice-President of the National Society and long-time friend of the Rockford branch members, was the speaker of the evening. Kelly spoke on the progress and inner workings of the National Society. This proved to be very interesting to all those present. We, of the Rockford branch, wish to sincerely thank Kelly for being able to be with us.

K. J. BUDDEN, Secretary

SAGINAW VALLEY

The January 12th meeting of the Saginaw Valley branch was attended by 65 members and guests. The meeting, which was held in the Colonial Room of the Zehnder Hotel in Frankenmuth, Mich., was preceded by a delicious chicken dinner.

The topic for the evening was "Complete Finishing of Steel, Prior to Electroplating," presented by **R. W. Redmond** of the Murray-Way Corporation.

The door prize, an electric drill kit, donated by **J. Whitley** of Electric Products Company, was won by **D. Shearer** of Ternstedt Division of General Motors Corporation.

A report by the nominating committee listed the members who were nominated for the coming elections.

RONALD R. MALTHANER,
Recording Secretary

ST. JOSEPH VALLEY

The regular monthly meeting of the St. Joseph Valley branch was held at the Hotel Elkhart, Elkhart, Ind., on February 2. Twenty-four members and guests attended the dinner and 27 were present for the technical session.

Donald C. Mayer was elected to active membership.

The following nominating committee was appointed: Dr. **Harold Wiesner,** chairman; Dr. **Ernest Wilhelm** and **Chester McDowell.**

The progress of the candidacy of **Duke Wysong** for the office of 3rd vice-president was discussed and **John Lockerbie** reported on the Chicago annual meeting.

A ten-minute question and answer period followed. **Ralph Brouwer** asked how to start the plating on high content lead alloys. **Schustic** indicated that electrolytic cleaning should be bypassed. **Bayman** suggested the use of sulfuric acid reverse cleaning and nickel plate direct on the base metal in place of copper.

Ralph Wysong expressed his thanks to those who filled out the questionnaires for the Research Committee on Plating of the American Society for Testing Materials.

President **John Bayman** then turned the meeting over to **Don Kraft,** librarian, who introduced **Harold Younger,** general manager of the Standard Plating Rack Company. He talked on plating racks and masking.

After the talk Younger answered many questions from the floor and illustrated masking and rack methods with samples.

EUGENE ROTH,
Secretary-Treasurer

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Branch News

SAN ANTONIO

This branch was honored with two excellent talks at its last regular meeting on January 17 at De Winne's Belgium Inn.

Speaking on "Recent Developments in Chromate Finishes," **L. C. Kingsbury**, vice-president of Allied Research Products Corporation, Baltimore, Md., outlined the development and uses of chromate finishes.

Jack A. Challacombe, field engineer, Beckman Instruments, Inc., South Pasadena, Calif., spoke on "*p*H Control in the Electroplating Industry," explaining how it is measured, and how important it is in most electroplating.

TOM COLLARD, *Publicity Chairman*

SOUTHEASTERN

The regular monthly meeting was held on December 10 at the Belmont Steak House. The meeting was called to order at 9 P.M. with 16 members and guests present, **Ray Chas. Steffey** presiding.

It was decided after a quiet discussion that our idea for a class of electroplating in one of our Atlanta schools would have to be postponed for the time being due to unavoidable circumstances beyond our control. The motion was therefore shelved until later. Our speaker of the evening was **Ray Strickland** of Allied Research. Strickland gave a very enlightening talk on chromate films. A question and answer period followed.

Our January meeting was held on January 14 with 18 members present. Due to our president, **Ray Steffey**, accepting a position in Statesville, N. C., with the Southern Screw Co., our First Vice-President **Clyde Stovall** presided. We all missed Steffey, and hope he can attend regularly even if he is a long way off. We wish him well in his new position.

Our speaker of the evening was our good friend and member, **D. J. Griffin**, owner of the Birmingham Plating Works, Birmingham, Ala. His topic was "Plating in the Future." Dave gave a very interesting talk, which was not only of interest to all present, but gave us a lot to think about in the future.

W. T. WEYMOUTH, *Secretary-Treasurer*

SOUTHERN TIER

The Southern Tier branch held a meeting at the Ah-Wa-Ga Hotel, Owego, N. Y., on January 17. The meeting was called to order by President **Zurenda**.

A proposal was made and discussed for having name badges made for members and guests at our meetings.

Plans were discussed for the first anniversary meeting in March.

A Research Finance Chairman will be appointed at the next meeting. Letters from the Executive Secretary were read by President Zurenda.

Stefanski introduced **Jack Price** of the American Chemical Paint Co. His talk was titled "Preparations of Metals Prior to Painting." He discussed early methods of metal preparation: (1) Sandblasting which was not highly recommended because it left small high spots; it had no corrosion resistance; it was costly; (2) Rubbing by steel wool—its shortcomings same as sand blasting; (3) Straight alkali cleaning left a high *p*H on surface whereas ideal conditions range 2.5 to 5.0; (4) Trichlorethylene—this removes oils and greases but it leaves soils on the metal surface as well as chlorides

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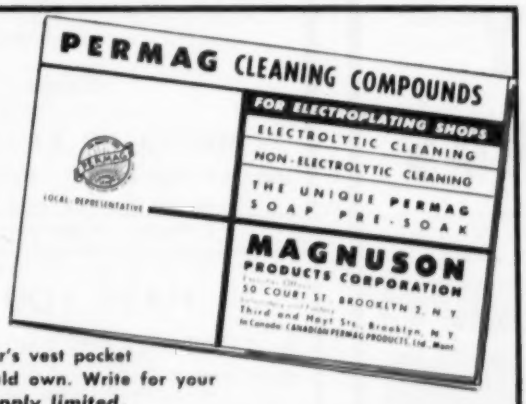

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Branch News

which tend to break down paint film. The best surface is one that is nearly chemically clean, has a tooth surface and a corrosion resistant coating.

In applying a phosphate surface five stages are necessary.

Power spray washing and treating is commonly used in large plants and 2000 sq ft/hr can be treated.

Immersion coatings are slower and may cost twice as much as spraying.

Iron phosphate coatings produce a thickness of 30–50 mgs per sq ft. They are used extensively on refrigerators and autos.

Zinc phosphates produce a film thickness 150–600 mgs/sq ft producing a good paint band and corrosion resistant coating. It can be produced by immersion; by spraying; and by wiping. Three to five minutes produce a good coating. Next, chromate coatings on zinc plating were discussed. An immersion process at room temperature improves corrosion resistance up to 100 hours in a salt spray test.

Treating of aluminum was the next topic. Previously, anodizing was extensively used. Then came phosphate coatings on aluminum which produced films of 100–200 mgs per sq ft. These produced a good paint band and were less costly than anodizing.

Next came the chromate films which were produced at room temperature by brushing, wiping, immersion and spraying. Salt spray resistance ranges up to 1200 hours.

The aircraft industry uses the coating for adhesive bonding.

A colorless film can be produced for sales appeal which gives a 200 hour salt spray test.

Price answered questions asked by attending members.

The meeting was adjourned at 10:50 P.M.

VINCENT T. MAXIAN, *Secretary*

SPRINGFIELD

Our speaker for this meeting, who was very well received and who was well informed on his subject of "Applications of Fluorborate Plating Solutions" was Newark's branch librarian **Clifford Struyk.** Thank you, Newark!

H. HEISSFELD, *Secretary*

SYRACUSE

The Syracuse branch held its January meeting at the Onondaga Hotel, January 17. Due to the excellent speaker and topic, the local branches of the ASM and staff members of the Electro-Chemical school of Syracuse University were invited to attend the meeting.

The speaker for the evening was **Clarence Sample** of International Nickel, Development and Research Div. His topic was "Corrosion of Coatings."

There were 37 present for the dinner and 56 present for the meeting.

The meeting was a good one and it also showed other groups the type of activity carried on by the AES.

A. G. MARTINEAU, JR.,
Recording Secretary

TORONTO

The regular monthly meeting of the Toronto branch was held on January 14 at the Royal York Hotel. Forty-eight attended the dinner, and 70 were present for the meeting which followed.

Kergan Wells, president, W. W. Wells Ltd., gave a very interesting talk on the "Methods and Results of Treating Metals Mechanically." Photomicrographs of various metals after buffing or polishing were shown.

The membership voted a $25 scholarship to the student with the highest term standing in the electroplating class at the Central Technical Night school classes.

The May meeting will be Past-Presidents' Night at which all past presidents and our honorary branch member will be our guests.

Josef Walter and **Thomas Clarke** were elected to branch membership.

The draw prize for a member in attendance at the dinner when his name is drawn was $50. **Harold Reece's** name was drawn, but he was not present so next month's prize will be $55.

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Branch News

WATERBURY

The regular monthly meeting of the Waterbury branch was held on January 13, in the Colonial Room of the Hotel Elton. Following dinner President **Perry Sloane** called the business meeting to order at 7:00 P.M. A lively discussion, led by **Joe Petrocelli,** centered around the question as to whether or not the branch favored a membership committee. The topic of Branch Exhibits also received about a fifteen minute discussion.

Technical Chairman **E. T. Candee** opened the technical session by introducing Dr. **George Dupernell** who gave a brief review of the books on *p*H measurement. An impromptu speaker, **William Phillips** of Deering Millikan Co., New York, N. Y., gave a brief talk on the technical aspects of buffing wheel fabric.

The main speaker, **Francis T. Eddy,** manager, Technicraft Laboratories, Inc., gave an excellent summation of "Plating Room Organization." A very lively discussion followed.

WILLIAM P. INNES,
Publicity Director

Sustaining Membership List

As of February 1955 (Figures in parenthesis indicate number of memberships held)

UNITED STATES

Accurate Electro-Plating, Inc.
Philadelphia, Pa. (Phil)
Acme Galvanizing, Inc.
Milwaukee, Wis. (Milw)
Acme Plating Company, The
Cleveland, Ohio (Clev)
Acme Steel Company
Chicago, Ill. (Chic)
Adolph Plating, Inc.
Chicago, Ill. (Chic)
Advance Plating Company, The
Cleveland, Ohio (Clev)
Aetna Electroplating Company, Inc.
Philadelphia, Pa. (Phil)
Alert Supply Company
Los Angeles, Calif. (L.A.)
Allen-Bradley Company
Milwaukee, Wis. (Milw)
Allied Industrial Products, Inc.
Chicago, Ill. (Chic)
Allied Research Products, Inc.
Baltimore, Md. (Bal-W)
Alsop Engineering Corporation
Milldale, Conn. (Htfd)
Aluminum Company of America
New Kensington, Pa. (Pitt)
American Anodizing & Plating Company
Chicago, Ill. (Chic)
American Buff Company
Chicago, Ill. (Chic)
American Cabinet Hardware Corporation
Rockford, Ill. (Chic)
American Can Company
Maywood, Ill. (Chic)
American Chemical Paint Company
Ambler, Pa. (Phil)
American Instrument Company
Silver Spring, Md. (Bal-W)
American Nickeloid Company
Peru, Ill. (Chic)
American Phenolic Corp.
Cicero, Ill. (Chic)
American Radiator & Standard Sanitary Corporation
Louisville, Ky. (Lvlle)
American Smelting & Refining Company
So. Plainfield, N. J. (Nwk)
American Wire Fabrics Corporation
Mt. Wolf, Pa. (Lanc)
American Zinc Institute (5)
New York, N. Y. (N. Y.)
Apex Plating Company
Chicago, Ill. (Chic)
Apollo Metal Works
Chicago, Ill. (Chic)
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Chicago, Ill. (Chic)
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Hartford, Conn. (Htfd)
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Chicago, Ill. (Chic)

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Auto City Plating Company
Detroit, Mich. (Detr)
Automotive Rubber Company
Detroit, Mich. (Detr)
Autoyre Company, Inc.
Oakville, Conn. (Wtby)

M. E. Baker Company
Cambridge, Mass. (Bost)
Bart Laboratories Company, Inc.
Belleville, N. J. (Nwk)
Bart-Messing Corporation
Belleville, N. J. (Nwk)
Bastian-Blessing Company, The
Chicago, Ill. (Chic)
Beacon Supply Company
Chelsea, Mass. (Bost)
Belke Manufacturing Company
Chicago, Ill. (Chic)
Bell & Howell Company
Chicago, Ill. (Chic)
Bell Telephone Laboratories, Inc.
Murray Hill, N. J. (Nwk)
Bendix Prods. Div., Bendix Aviation Corp.
So. Bend, Ind. (St Jo)
Berteau-Lowell Plating Works
Chicago, Ill. (Chic)
Bethlehem Steel Company (2)
Bethlehem, Pa. (Al-Rd)
Big Ben Petroleum Products Co.
Chicago, Ill. (Chic)
Blakeslee, G. S. & Company
Cicero, Ill. (Chic)
Bruce Products Corporation
Howell, Mich. (Detr)
Buckeye Products Company, The
Cincinnati, Ohio (Cinc)
Buckingham Products Company
Detroit, Mich. (Detr)

California Rack Company
South Gate, Calif. (L. A.)
Chandeysson Electric Company
St. Louis, Mo. (St. L.)
Chase Brass & Copper Company
Waterbury, Conn. (Wtby)
Chemical Corporation, The
Springfield, Mass. (Spfd)
Chicago Electro-Platers Institute
Chicago, Ill. (Chic)
Chicago Roller Skate Company
Chicago, Ill. (Chic)
Chicago Thrift-Etching Corp.
Chicago, Ill. (Chic)
Christie Plating Company
Groton, Conn. (N. H.)
Chrome-Rite Company (2)
Chicago, Ill. (Chic)
Chromium Corporation of America
New York, N. Y. (Chic)
Chromium Process Company, The
Derby, Conn. (N.H.)
Chrysler Corporation (2)
Detroit, Mich. (Detr)
Clevite-Brush Development Company,
Division of Clevite Corporation
Cleveland, Ohio (Clev)
Clinton Company, The
Chicago, Ill. (Chic)
Codman, F. L. & J. C. Company
Rockland, Mass. (Bost)
Continental Can Company, Inc.
Coffeyville, Kansas (Wich)
Corona Corporation
Jersey City, N. J. (Nwk)
Cowles Chemical Company, The
Cleveland, Ohio (Clev)
Crane Company
Chicago, Ill. (Chic)
Croname, Incorporated
Chicago, Ill. (Chic)
Crown City Plating Company
Pasadena, Calif. (L. A.)
Crown Cork & Seal Company
Baltimore, Md. (Bal-W)
Crown Rheostat & Supply Company
Chicago, Ill. (Chic)
Cutler-Hammer Company
Milwaukee, Wis. (Milw)

Darco Dept., Atlas Powder Company
New York, N. Y. (N. Y.)
Davies Supply & Manufacturing Company
St. Louis, Mo. (St. L.)
Diamond Alkali Company
Cleveland, Ohio (Clev)
Diversey Corporation, The
Chicago, Ill. (Chic)
Dixie Electro Plating Company
Houston, Texas (Hstn)
Doehler-Jarvis Corporation (2)
Grand Rapids, Mich. (Gr R)
Donald Sales & Mfg. Company
Milwaukee, Wis. (Milw)
R. R. Donnelley & Sons Company
Chicago, Ill. (Chic)
E. I. duPont de Nemours & Co., Inc.
Wilmington, Del. (Bal-W)
Duro-Chrome of Chicago, Inc.
Chicago, Ill. (Chic)

Eastman Kodak Company (2)
Rochester, N. Y. (Roch)
Eaton Manufacturing Company
Cleveland, Ohio (Clev)
Ekco Products Company
Chicago, Ill. (Chic)
Electric Auto-Lite Company, The (2)
Toledo, Ohio (Tldo)
Electro Glo Company
Chicago, Ill. (Chic)
Electrolux Corporation
Old Greenwich, Conn. (Bdpt)
Enthone, Inc.
New Haven, Conn. (N.H.)

Felt & Tarrant Manufacturing Company
Chicago, Ill. (Chic)
Finishing Publications, Inc.
Westwood, N. J. (Nwk)
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Oklahoma City, Okla. (Unasgnd)
Ford Motor Company (5)
Dearborn, Mich. (Detr)
Formax Manufacturing Company
Detroit, Mich. (Detr)
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Dayton, Ohio (Dayt)
P. B. Gast Company
Grand Rapids, Mich. (Gr R)
General American Transportation Corp.
Kanigen Division
Chicago, Ill. (Chic)
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Allentown, Pa. (Al-Rd)
Grand Rapids Plating Company
Grand Rapids, Mich. (Gr R)
Grand Steel Company
Clawson, Mich. (Detr)
Great Lakes Industries, Inc.
Chicago, Ill. (Chic)
Gumm, Frederick, Chemical Company
Kearny, N. J. (Nwk)

C. Hager & Sons Hinge Mfg. Co.
St. Louis, Mo. (St. L.)
Hall-Mack Company
Los Angeles, Calif. (L. A.)
Hamilton Watch Company
Lancaster, Pa. (Lanc)
Hammond Machinery Builders, Inc.
Kalamazoo, Mich. (Gr R)
Hanson-Van Winkle-Munning Co. (3)
Matawan, N. J. (Chic & Nwk)
Harding Manufacturing Company
Detroit, Mich. (Detr)
Hardwood Line Manufacturing Company
Chicago, Ill. (Chic)
Harshaw Chemical Company, The (3)
Cleveland, Ohio (Clev)
Heil Process Equipment Corporation
Cleveland, Ohio (Clev)
Houdaille-Hershey Corporation (3)
Detroit, Mich. (Detr)
Howard Plating Industries, Inc.
Royal Oak, Mich. (Detr)
Howell Company, The
St. Charles, Ill. (Chic)
Hudson Motor Car Company
Detroit, Mich. (Detr)
R. O. Hull & Company, Inc.
Rocky River, Ohio (Clev)
Hy-Grade Electroplating Company
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International Nickel Co., Inc. (5)
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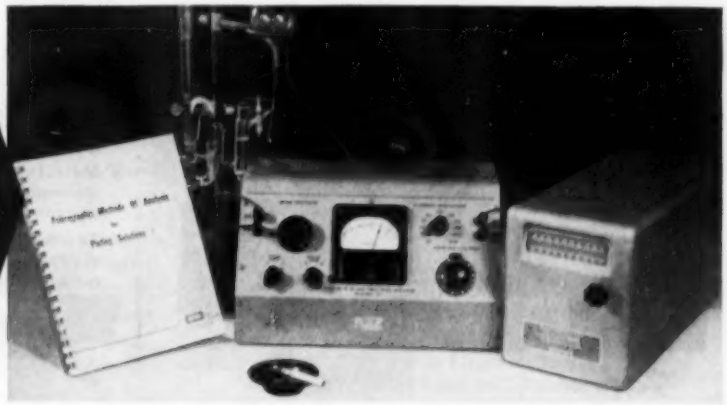

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The Patent Button Company

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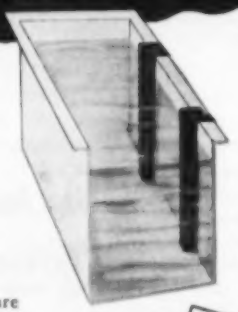

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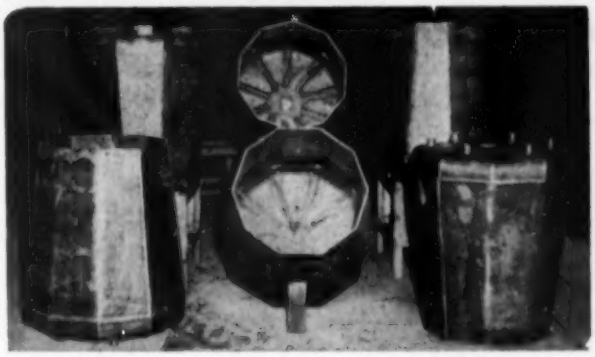

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N. B.

On January 1, 1955 the Production Office of PLATING was moved from Philadelphia to the headquarters office located at **445 Broad Street, Newark 2, New Jersey.** Please adjust your records accordingly and in future send all plates, cuts, copy, proofs, correspondence, etc., to this address.

AES Membership Changes

Elections

ADELAIDE: Wolfgang Bockisch

BALTIMORE-WASHINGTON: John C. Wilhelm

CAPITOL DISTRICT: D. James Barone

CENTRAL MICHIGAN: Arthur B. Covey, Harmon C. Everett, Harry E. Kratzer, Norman J. Lenneman, Arthur L. Simpson, Beal N. Sisco, Ealum H. Spraker, David D. Trafelet, Clarence F. Wilson

CHICAGO: Donald H. Decker, Charles N. Jensen, Alfred R. Karow, Julius J. Krueger, Eugene H. Martin, Joseph Maune, Dr. J. Robert Spraul

CLEVELAND: Robert L. Gates, William P. Hayduk

DALLAS-FORT WORTH: Lloyd D. Smith

DAYTON: Jack D. Hoffman, Glenn C. Winston

DETROIT: Henry E. Adelsperger, III, Loren C. Barnhouse, Martin C. Brennan, Michael J. Bubnar, Stanley M. Dobrash, Claude S. Farrell, Delmer G. Ferguson, David A. Goss, Leonard B. LaForce, Gunnar C. T. Lindh, Howard E. Morse, Jr., Edwin O. Mudie, Stanley J. Omillian, Lawrence V. Puls, James J. Ryan, Frank J. Sambrook, Austen J. Smith, Thomas S. Tomezak

GRAND RAPIDS: Earle L. Blakeslee, Werner Blumenthal

HOUSTON: Miller B. Walker

MONTREAL: Paul Babin, Lucien Brunet, George O. Palmer, Donald W. Walker

NEW HAVEN: Longin P. Dinkow, Edward R. Jorczyk, George F. O'Connor, Adam J. Walsh, Jr.

PITTSBURGH: Michael A. Petrucci, Walter G. Sittmann, Charles H. Walton

SAGINAW VALLEY: Donald R. Catrell, Douglas H. Fairchild, Edward B. Galbraith, Raymond E. Gittins, James A. Hudson, George C. Kinde, Charles Melekian, Harold J. Pratt, Robert D. Smith, Paul A. Waskovich, Edward D. Wilson

ST. JOSEPH VALLEY: Kennith Mitchell

SOUTHERN TIER: Michael J. Capece

SYRACUSE: Henry J. Crouse, Robert A. Gullotta

TOLEDO: Julius C. Bach, Stanley Moore

WATERBURY: Samuel L. Longo

Reinstatements

PITTSBURGH: Richard A. Dimon

ROCHESTER: Emil Pottridge, Philip Ronco

SPRINGFIELD: Perry W. Fogg

Transfers

BUFFALO: Emil J. Pieper to Rochester

DAYTON: John R. Goss to Detroit

GRAND RAPIDS: Alfred G. Lee from Central Michigan, Frank K. Savage from Chicago

LANCASTER: George Skelly to Columbus

Suspensions

DETROIT: Stanley F. Czajkowski, Harold Gardynik, Nick Novikoff, John J. O'Day, Clyde L. Ryan

GRAND RAPIDS: Harry Bill, Curtiss H. Boos, Edward W. Gross, Warren B. Harnden, James Siegel, Addison C. Snyder.

HOUSTON: Glenn W. Brandt, H. W. Fahrenthold, R. L. Gavin, Delford W. Lackey

SAGINAW VALLEY: D. J. Botts, Gerald J. Carroll, G. W. Cline, Emery F. Gravelle, Jr., J. O. Lovelace, R. A. Marshall, L. M. Norberg, F. J. Shannon, J. A. Thomas, Preston W. Wolf

SEATTLE: Mitch Aslanian

WATERBURY: Patrick R. Mazzamaro (In Armed Service)

Resignations

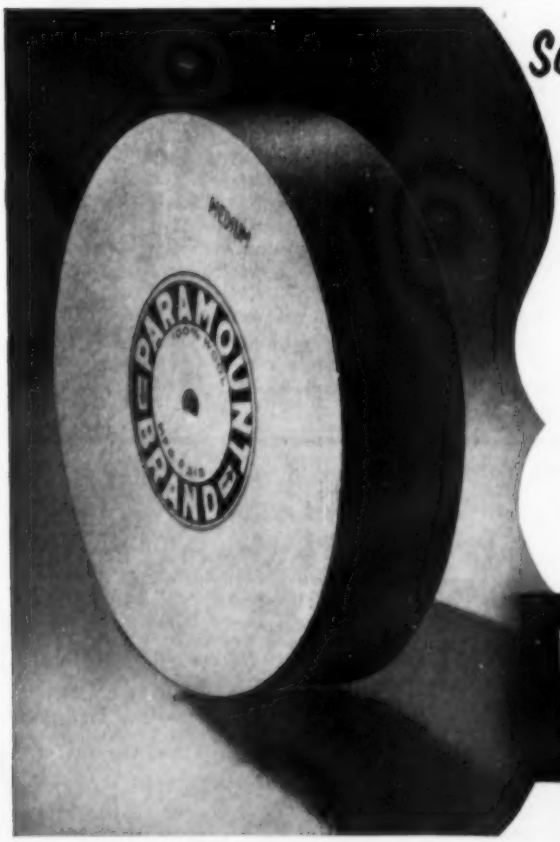
CHICAGO: Deane C. Smith

HARTFORD: Kermit Simons

SAGINAW VALLEY: Arthur P. DuRussell, Charles A. Reid

Deaths

CHICAGO: H. Allen George, Harry O. Schuessler, Ralph Shannon



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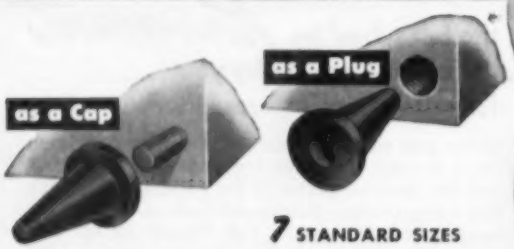

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Future Meetings

CAPITOL DISTRICT, AES, annual meeting, Menands, New York, March 7, 1955.

WATERBURY BRANCH, AES, annual meeting, Hotel Elton, Waterbury, Connecticut, March 10, 1955.

BALTIMORE-WASHINGTON BRANCH, AES, annual meeting, Washington, D. C., March 12, 1955.

LOUISVILLE BRANCH, AES, annual meeting, Louisville, Kentucky, March 17, 1955.

ROCKFORD BRANCH, AES, annual meeting, Faust Hotel, Rockford, Illinois, March 19, 1955.

LOS ANGELES BRANCH, AES, 25th annual technical session and dinner-dance, Hotel Ambassador, Los Angeles, California, March 19, 1955.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, Kentucky Hotel, Louisville, Kentucky, March 20–23, 1955.

SECOND ANNUAL TRI-STATE NATIONAL MEETING, AES, Columbus, Ohio, March 26, 1955.

CINCINNATI BRANCH, AES, annual meeting, Columbus, Ohio, March 26, 1955.

NINTH WESTERN METAL EXPOSITION, Pan-Pacific Auditorium, and Ninth Western Metal Congress, Ambassador Hotel, Los Angeles, California, March 28–April 4, 1955.

TWIN CITY BRANCH, AES, annual meeting, The Covered Wagon, Minneapolis, Minnesota, April 4, 1955.

127TH MEETING, AMERICAN CHEMICAL SOCIETY, Cincinnati, Ohio, March 29–April 7, 1955.

AMERICAN CHEMICAL SOCIETY, 127th meeting, Cincinnati, Ohio, March 29-April 7, 1955.

BRIDGEPORT BRANCH, AES, annual meeting, Hotel Barnum, March 29-April 7, 1955.

AES RESEARCH COMMITTEE, Hotel Seneca, Rochester, New York, April 15, 1955.

UPPER NEW YORK REGIONAL MEETING, AES, Hotel Seneca, Rochester, New York, April 16, 1955.

INDIANAPOLIS BRANCH, AES, annual meeting, Indianapolis Athletic Club, Indianapolis, Indiana, April 23, 1955.

PLATING EDITORIAL BOARD MEETING, Hotel Schroeder, Milwaukee, Wisconsin, April 29, 1955.

BOSTON BRANCH, AES, annual technical session and banquet, Hotel Statler, April 30, 1955.

MILWAUKEE BRANCH, AES, annual meeting, Schroeder Hotel, Milwaukee, Minnesota, April 30, 1955.

TORONTO BRANCH, AES, annual meeting, Sherton-Brock Hotel, Niagara Falls, Ontario, May 7, 1955.

37TH ANNUAL BANQUET AND ENTERTAINMENT OF THE MASTERS' ELECTRO-PLATING ASSOCIATION, INC., Plaza Hotel, New York City, May 7, 1955.

16TH ANNUAL NEW ENGLAND REGIONAL MEETING, AES, Hotel Statler, Hartford, Connecticut, May 14, 1955.

42ND ANNUAL AES CONVENTION AND 4TH INDUSTRIAL FINISHING EXPOSITION Municipal Auditorium, Cleveland, Ohio, June 20—23, 1955.

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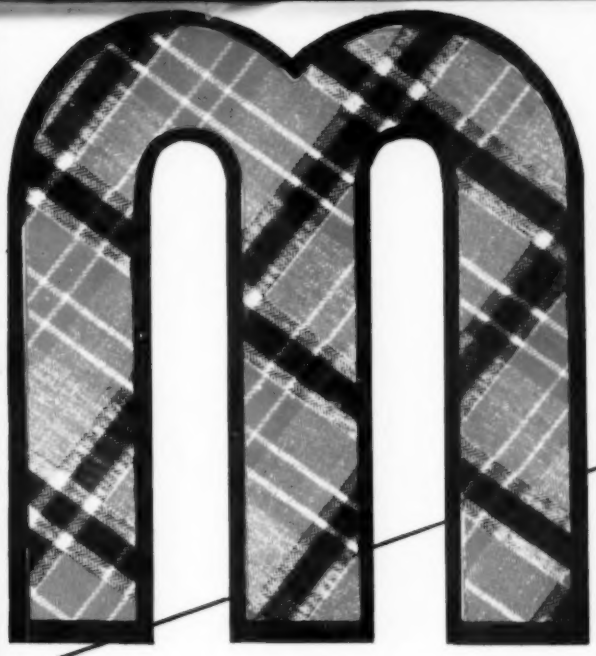

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